S. HRG. 101-586

CARSON RIVER SUPERFUND SITE

HEARING

BEFORE THE

SUBCOMMITTEE ON SUPERFUND, OCEAN, AND WATER PROTECTION

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

FEBRUARY 12, 1990—CARSON CITY, NEVADA

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MONDAY, FEBRUARY 12, 1990

U.S. SENATE, COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS, SUBCOMMITTEE ON SUPERFUND, OCEAN, AND WATER PROTECTION

Carson City, NV.

The Subcommittee met, pursuant to notice, at 9:30 a.m. in room 131, Legislative Building, Carson City, Nevada, Hon. Harry Reid (acting chairman of the subcommittee) presiding.

Present: Senator Reid.

OPENING STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM THE STATE OF NEVADA

Senator REID. Good morning, ladies and gentlemen. Welcome to the hearing of the Subcommittee on Superfund, Ocean, and Water Protection of the Senate Environment and Public Works Committee to consider issues surrounding mercury contamination of the Carson River.

In 1978, chemical waste dumped into the abandoned Love Canal decades earlier by Hooker Chemical Company was discovered seeping into basements in Niagara Falls, New York. A Federal emergency was declared. Two hundred homes were abandoned and even a school was closed. Studies found high incidence of miscarriages and low birth-weight babies among residents, and questions were raised about birth defects, cancer, and other illnesses.

The Superfund Program, authorized by the 1980 Comprehensive Environmental Response, Compensation, and Liability Act was prompted by the tragedy of Love Canal. Initially the law created a five year, $1.6 billion "superfund" to pay for a national clean-up of hazardous waste sites and other chemical spills and releases. Unfortunately, thousands of sites have been identified. Clean up will take decades, costing billions of dollars.

Under the law, the EPA is required to determine the most dangerous sites, place them on the national priorities, and give the agency power to force those responsible to clean them up. EPA can conduct clean-ups using the Superfund and later sue responsible parties to recover the money. EPA can give States lead responsibility for clean-up of these sites.

On October 25, 1989, a 50-mile stretch of the Carson River was proposed by the State to become Nevada's first site for clean-up under the Superfund program. The reason for seeking Superfund status is due to mercury contamination. Mercury has a wide variety of industrial uses and was commonly used in the late 1800s to separate precious gold and silver metals from ore.

Well known as an ancient Roman messenger of the gods, Mercury was also the god of commerce, thievery, eloquence, and even science. Mercury is used in medicine, in barometers, thermometers, pesticides, and even dental fillings. This hearing will focus on the darker side of mercury.

If ingested, mercury passes into the blood from the digestive system and is carried to the liver and kidneys. According to medical sources, both organs may be inflamed, scarred, or poisoned in the process. Common symptoms are loss of appetite, indigestion, diarrhea. More serious illnesses associated with mercury poisoning are renal failure, colitis, and uremia. Death does occur in acute cases of poisoning.

Mercury reduces the flow of oxygen to the brain and causes degeneration of nerve cells. Tremors, behavioral disorders, lethargy, depression, and headaches are common symptoms of exposure. More serious symptoms include numbness, and damage to sight and hearing. Mercury can harm the reproductive organs. Infertility or birth defects may follow. In children, mercury poisoning may lead to learning difficulties and diminished IQ levels.

But perhaps the most infamous incidence in mercury poisoning in recent years occurred in Japan. The Chisson Corporation began dumping mercury into Minamata Bay during the 1930s and continued to discharge mercury into the sea for the next three decades. Slowly, the effects of mercury poisoning became apparent. In 1950, fish began floating belly up, birds were seen dropping into the sea, and cats were seen "dancing" in the streets. In 1956, the first sign of mercury poisoning in people began to appear. The townspeople of Minamata began to suffer from numb hands and feet, tunnel vision, a loss of coordination and balance, chronic pain, and convulsions. In many cases death followed. During the 1960s and 1970s, more than 800 people died and thousands more were painfully crippled as a result of mercury poisoning. And if such suffering were not enough, babies began to be born with severe birth defects.

The use of mercury in industry is regulated by the Occupational Safety and Health Administration and other Federal agencies. Poisoning from exposure to mercury in an occupational setting in the United States is rare; but it is common in developing countries. Recent newspaper reports suggest that mercury poisoning is a problem in Brazil where extensive gold mining is taking place. Further stories report the death of a 10-year-old boy who was employed in a thermometer factory in South Korea.

In the United States, mercury poses an environmental—rather than an occupational—threat. Past industrial uses of mercury has lead to contamination of land, lakes, rivers, and seas. There is also some evidence to suggest that acid rain dissolves heavy metals like mercury into rivers and lakes.

When mercury contaminates rivers and lakes, it poisons fish, insects, frogs, and micro organisms. Birds have also been found poisoned by mercury, and a number of Florida panthers have suffered the same fate. It is common knowledge that if humans eat contaminated fish or other animals, they, too, may suffer from mercury poisoning.

The Environmental Protection Agency states that the Carson River Mercury Site consists of, one, sediments in an approximately

50-mile stretch of the Carson River in Lyon and Churchill counties, beginning between Carson City and Dayton and extending downstream through the Lahontan Reservoir to Stillwater National Wildlife Refuge; and two, tailing piles associated with the river.

The Nevada Division of Environmental Protection has documented extensive mercury contamination. An estimated 7,500 tons of mercury were lost in the milling process during the 30-year peak of the Comstock Lode. Only about 0.5 percent was later recovered—or 375 tons of the 7,500 tons, leaving 7,225 tons of mercury, or about 15,000 pickup truck loads of mercury in the river.

The Carson River Mercury Site extends over a large area and potentially affects several sources of ground water. An estimated 1,400 people obtain drinking water from wells within three miles of the site. Approximately 1,200 acres of food and forage crops are irrigated by the Carson River between Dayton and the Lahontan Reservoir. The recreational values associated with the Carson River have also been negatively affected.

Testimony received today from Ms. Strauss of the EPA's Region IX Office in San Francisco will address concerns raised about the status of the Carson River Mercury Site in the Superfund program.

Officials representing the Nevada Division of Environmental Protection, the Department of Wildlife, the Department of Minerals, and the Health Division will provide insights into the questions raised about the presence of mercury and its potential effects on health, wildlife, and agriculture. Local officials will speak to these concerns as well.

Testimony will also be received from technical advisors regarding engineering techniques to mitigate the adverse effects of mercury's presence in the River. Ongoing research efforts demonstrate that contaminants in the Nation's rivers, streams, and lakes can be effectively removed. Technologies which have been effective in the safe removal and treatment of contaminants from marine sediment may also be addressed.

In closing, this hearing will sort out several concerns about the presence of mercury in the Carson River. Should it be left alone or should it be excavated? If the mercury is removed, what can we do with the mercury? Following the hearing, the subcommittee may request the Office of Technology Assessment to conduct a technical review of the comments received today so that we can begin to answer those important questions. I think it is important after 100 years that we recognize the River is polluted and that we try to determine if anything can be done about the pollutants in the River.

We are going to take the witnesses in a slightly different order than indicated on the printed list. We are going to start by hearing from the Mayor of Carson City, Mayor Teixeira, followed by Mr. Rasner and Doctor Christian; then we will get back to the scheduled order.

Mayor, welcome to the committee.

STATEMENT OF HON. MARVIN TEIXEIRA, MAYOR, CARSON CITY, NEVADA

Mayor TEIXEIRA. Thank you, Senator. For the record, I am Marvin Teixeira, Mayor of Carson City, Nevada. I thank you for the opportunity to testify before you this morning.

The designation of the 50-mile stretch of the carson river is Nevada's first site for clean-up under the Superfund program speaks to the problem at hand.

As you know, Senator, some 20 years ago there was little concern and little was known about the mercury deposits in the Carson River system.

Then, starting in 1970, with the Food and Drug Administration's study, the 1971 USGS study, the 1973 R.T. Richins and A.C. Risser study, the 1975 R.T. Richins and A.C. Risser study, and 1976 G.C.A. Ekechukwu—that's tougher than Teixeira, I'll tell you—study, and the 1983 D.R.I. study, a consensus surfaced. These studies targeted the Carson River system for inclusion on a list of potential clean-up site.

The concerns generated an investigation by the State of Nevada, division of Environmental Protection, which began in 1983 and was published in 1985. In layman terms, there is a lot of mercury deposits in the Carson River system, with the highest concentration being in the Dayton to Lahontan stretch.

Although that stretch of the River is not within Carson City's boundaries, it does affect the 40,000 residents of my community. Many of Carson City's residents fish, camp, and boat on the Carson River and at Lahontan Reservoir.

I would like to comment on the Health Advisory's notice published by the state of Nevada, Department of Human Resources, Health Division, as it relates to the Lahontan Reservoir. The Division of Health advises:

No one should eat more than one meal per month of fish caught from these waters. A meal is to be eight ounces of fish;

No child under age 12 should eat fish from the Lahontan Reservoir;

Children 12 to 15 years old should eat no more than one four-ounce meal per month of fish caught from these waters;

Pregnant women, nursing mothers, and women who may soon become pregnant should not eat from the Lahontan Reservoir; and

Walleye over 21 inches in length should not be eaten at all.

Senator, you can advise but you can't control people who do not believe, understand, or have knowledge of this advisory.

Lyon County is our neighbor and its problems are our problems. Lyon county and Carson City do not have the financial resources to address a problem of this magnitude now or in the future—or, for that matter, a freeway bypass. Only the Federal Government has the resources to address this problem.

I am well aware that possible funding for resolving the mercury problem in the Carson River will have to be considered along with the many, many other projects submitted.

I thank you for your time and your consideration concerning a problem that will not go away by itself, but rather, has the potential of getting worse with time.

Thank you, Senator.

Senator REID. Mayor, I appreciate your testimony. Just in passing, I appreciate your leadership on the transportation issue. It has attracted attention, as it should, and I look forward to working with you on this issue in the months to come. Hopefully, we are going to have a transportation summit in this area in April, and we want you to be involved in that with all the work that you've done here.

Let me just ask a couple of questions. It would be a fair statement, would it not, Mayor, that the full recreation potential of the Carson River is affected as a result of this pollution?

Mayor TEIXEIRA. Absolutely, sir.

Senator REID. In fact, there isn't much done to promote the recreational benefits of the carson River, isn't that true?

Mayor TEIXEIRA. Right. At the present time, none is, Senator. But I will say that the State has done a good job in establishing the Lahontan Reservoir for recreation and money is put in there and it continues to become——

Senator REID. All it needs now is water.

Mayor TEIXEIRA. That's it. It's a little short of water, right; and good water.

Senator REID. The areas of the Carson River—and I will ask this of other witnesses, perhaps, if you're not able to answer—is it posted as to the dangers that exist?

Mayor TEIXEIRA. The amount that you may eat is, I think, is posted at strategic points. But we have so many people and I think what is happening more and more as time goes on is people are going out, people can't get on the Carson River, and I believe—Although it would be strictly a guess on my part—but I would say less than 50 percent of the people have knowledge that there is any problem with eating the fish. So we might have a potential risk out there.

I think the State is doing what it can do without scaring people away from a recreation complex. So it is a delicate balance of, yes, you can fish and you can do this, but be aware of problems. We have a lot of out of State people, Senator, that come and use Lahontan Reservoir.

Senator REID. Thank you very much, Mayor.

Mayor TEIXEIRA. Thank you, Senator.

Senator REID. The first panel of witnesses will be that of Darrell Rasner, who is with the Department of Human Resources, Nevada Health Division; and Doctor Duane Christian, who is a dentist practicing in Carson City, Nevada. Doctor Christian and Mr. Rasner, would you please come forward and take a seat.

What I would like to do is have each of you give your testimony, beginning with Darrell Rasner, and then I would have questions for both of you.

Mr. Rasner, please proceed.

STATEMENT OF DARRELL RASNER, DEPARTMENT OF HUMAN RESOURCES, NEVADA HEALTH DIVISION

Mr. RASNER. Senator Reid, my name is Darrell Rasner. I represent the Nevada State Health Division. Myla Florence, our Admin-

istrator, was unable to be here today due to a scheduling conflict. I would like to read her correspondence as testimony:

DEAR SENATOR REID: Thank you for requesting the Nevada Division of Health to present information to the legislative subcommittee studying the proposed Carson River Superfund Site. We commend the committee for conducting this hearing.

In May 1986, the Nevada Division of Health issued a public health advisory recommending the maximum consumption of game fish from Lahontan Reservoir. The advisory was based on the Nevada Division of Environmental Protection report. "Total Mercury in Sediment, Water and Fish in the Carson River Drainage, West-Central Nevada."

The Health Division modified the health advisory in May 1987 as a result of new information which indicated greater health risks from consumption of fish found in the Lahontan Reservoir, and the advisory is attached. The Department of Wildlife included the health advisory in their 1987 publication, "Fishing Seasons and Regulation." The Health Division will be modifying the health advisory this spring to be consistent with the 1990-1991 Fishing Seasons and Regulations. The change advises gamefish, rather than Walleye, over 21 inches in length should not be eaten.

In the mid 1980s, the Health Division Laboratory conducted bioassays of fish collected in Lahontan Reservoir. The bioassay results indicated a wide range of mercury concentrations in the flesh, depending upon species and size. The larger, more mature fish had higher concentrations. This is due to the bioaccumulation of mercury in predatory fish, which are higher on the food chain.

The most important effect of methylmercury of humans is to the central nervous system. Signs of poisoning include lack of coordination, the feeling of "pins and needles," numbness of lips and mouth, constricted visual field, night blindness, tremors, deafness and/or diminished taste and smell.

The World Health Organization studies of mercury poisoning in Japan, Sweden, and Iraq indicate that in the most sensitive individuals, the onset of symptoms do not occur until blood mercury levels exceed 200 ng/ml, or nanograms per milliliter. The health advisory is based on the U.S. Food and Drug Administration action level of 1.0 mg/kg (microgram per kilogram), as methylmercury in the edible portion of the fish. The health advisory is designed to limit blood mercury to 20 ng/ml, providing a safety factor of 10.

The Nevada State Health Division Advisory reads as follows:

No one should eat more than one meal per month of fish caught from these waters. A meal is to be eight ounces of fish;

No child under age 12 should eat fish from the Lahontan Reservoir;

Children 12 to 15 years old should eat no more than one four-ounce meal per month of fish caught from these waters;

Pregnant women, nursing mothers, and women who may soon become pregnant should not eat from the Lahontan Reservoir; and

Walleye over 21 inches in length should not be eaten at all. That will be changed to all gamefish over 21 inches in length.

The Division of Health is concerned that fisherman at Lahontan Reservoir may be ignoring the advisory and consuming fish at a greater frequency than that recommended here. Sixty percent of respondents to a 1988 Department of Wildlife survey said that the mercury advisory would not inhibit their fishing practices.

In addition, in March 1989, the Health Division issued a Health Advisory for the consumption of Shoveler ducks harvested in the Carson Lake area. The advisory was issued at U.S. Fish and Wildlife officials presented data showing mercury levels as high as 55.7 mg/kg in the duck muscle tissue. The advisory stated:

No one under age 15 and no woman who is pregnant, nursing, or considering pregency, should consume shovelers from the Carson Lake area;

Waterfowl livers should not be consumed; and

Others intending to consume these waterfowl should do so in small portions and then only infrequently.

The advisory was reissued in September 1989 prior to opening of duck season.

There are no public drinking water systems supplied by the stretch of Carson River proposed for Sueprfund designation. There are private domestic wells along the river in Dayton and Fort Churchill. Limited testing has not detected the presence of mercury in the groundwater.

The mercury potentially affects anglers at Lahontan Reservoir, waterfowl hunters in the Carson Lake area, and individuals served by wells along this portion of the river. No case of mercury poisoning resulting from this source of exposure has been documented.

In closing, the Nevada Division of Health supports any measure to redauce or eliminate the public's exposure to mercury from the Carson River.

Senator REID. Thank you, Mr. Rasner.
Doctor Christian, you may proceed.

STATEMENT OF DUANE CHRISTIAN, CARSON CITY, NEVADA

Dr. CHRISTIAN. Thank you, Senator Reid and members of the United States Senate Subcommittee on Superfund, Ocean, and Water Protection. I have been asked to speak to you about the effect of mercury on human health.

I am Doctor Duane E. Christian, a dentist who has been in Carson City for nearly 30 years. For the last 20 years I have included in my practice an awareness of the effects of dental materials on total health. Because of my concerns about the health effects of mercury, I have not placed a silver-mercury filling in my patients for over 10 years.

As has been previously addressed, in the current Nevada Department of Wildlife Fishing Regulations appears the statement relative to the fact that pregnant women, nursing mothers, and women contemplating pregnancy should not eat fish from the Lahontan Reservoir and Carson River below Lahontan Dam, and all waters in Lahontan Valley.

The scientific literature that addresses the mercury problem leaves no question in anyone's mind that mercury is toxic to the human body. Evidence clearly indicates that it has an effect on major body systems and organs ranging from miscarriage and congenital abnormalities, to irritability, depression, headaches, reduced ability to think and decline of intellect, fatigue, allergies, abnormal heart function, reduced immune system effectiveness, manic depression, and on and on. Because of the limited time today, I have chosen to report specifically on some of the latest research relative to the hazards of mercury, from whatever source, whether from food or water from the Carson River drainage or from the mercury-silver amalgam fillings in your teeth.

Certainly one of our major concerns is to have normal babies. Doctor David Eggelston has studied the number of mercury amalgam fillings as it correlates to the amount of mercury in the brain of sudden unexpected death subjects at the Los Angeles County Coroner's Office. One of the subjects was a twenty-seven year old woman who was seven months pregnant; both mother and her unborn child died in the accident. A brain sample was taken from the fetus immediately upon removal from the womb, as well as from the mother. It was determined that the fetal brain contained two-thirds the level of mercury found in the mother's brain. The amalgam had been in her mouth for up to twenty years, but the fetus had accumulated the two-thirds level in only seven months, most likely through the placenta from maternal blood.

The World Health Organization has stated that there is no known safe level of mercury in the body below which no known health problems will occur. Might Multiple Sclerosis, Parkinson's Disease, and Alzheimer's Disease be explored as being contributed to by long-term low level exposure to mercury? Certainly, the Minamata disease, which results in gross birth defects and mortality in

newborns, and neurological problems in adults, including a high incidence of Cerebral Palsy, which has been linked to the consumption of mercury-containing fish, although the exact mechanism is not known.

In recent research at the University of Calgary Medical School in Alberta, Canada, dental amalgam fillings containing radioactive tagged mercury 203 were placed in pregnant sheep. The use of radioactive tagged mercury 203 allows specific identification of the mercury source, preventing possible misidentification with mercury from other potential sources. At birth, most fetal tissues had higher levels of mercury than did the maternal tissues. During lactation, there was eight times more mercury in the milk of the mother than in her blood stream. This dramatic research is a major breakthrough in the mercury amalgam controversy. It has been well established that the developing fetus, whether sheep or human, is extremely susceptible to the invasion of harmful chemicals, including mercury.

In 1988 the Health and Welfare Board of Sweden stated that no extensive amalgam work should be done on pregnant women in order to reduce the risk for fetal damage. A total ban after 10991 on the use of amalgam in Sweden has been declared by their Chemical Inspection Agency, which is Sweden's Environmental Protection Agency.

Certainly a major concern in our society today has to do with reduced immune system effectiveness. Another study performed by Doctor David Eggelston suggests that dental amalgam and dental nickel alloys can adversely affect the quality and quantity of T-lymphocytes. A malfunction of T-lymphocytes can increase the risk of cancer, infectious diseases, and auto-immune diseases.

Historically, the mercury in the Carson River came from the mining operations of the Virginia City era. Today, the question must be raised about how much mercury is being contributed to waste water treatment effluent by the waste from dental offices. Only one county in the Nation, Pima County in Arizona, requires that the effluent from dental offices be monitored for mercury level. Since implementation in 1985, seventy-three violations have occurred, with seventy-one being dental offices.

Gentlemen, Senator Reid, I personally feel that the people and wildlife who live in the Carson River-Lahontan System are at high risk from mercury levels in the water, fish, and soil. Though it won't be an easy project, the need justifies your being here to gather data and find a solution for this problem which can then be used to curtail such contamination in other areas of our great country.

Thank you.

Senator REID. Doctor Christian, I very much appreciate your testimony because I think it points out that the situation is more than just mercury being in the bottom of a river running through Nevada. I think it makes us pause to consider all of the ailments plaguing people the causes of which remain a mystery. Your testimony, which the committee will receive, might cause us to broaden this and look into your specific areas at some subsequent time.

In addition to your statement today, Doctor Christian, you wrote me previously about the mercury issue—in fact, I think it was in

December—and you included with that letter to me some interesting articles from different publications.

I will direct that your letter be included in the record of this hearing and the articles be retained in the committee files.

[The letter referred to follows:]

Duane E. Christian, D.M.D., LTD.

FAMILY DENTISTRY

810 NORTH NEVADA STREET
CARSON CITY, NEVADA 89701

PHONE (702) 882-4122

10 December. 1989

U.S. Senator Harry Peid
324 Hart Building
Washington. D.C. 20510

Re:Mercury used in Dentistry

Dear Senator Peid:

In a letter from you. dated 2º August. 1986. you invited me to feel free to call on you if the Institute of Dental Research's reply "is anyway unsatisfactory" and that you would be glad to follow-up on my behalf. Their answer at that time was typically unsatisfactory from the dental establishment but I chose not to persue the matter at that time.

Now that you are Chairman of the Senate Subcommittee examining issues of toxic substances. I am forwarding to you current information relative to the issue on the continued use of mercury-silver amalgam fillings in Dentistry with the continued blessing and encouragement of established dentistry inspite of accumulating evidence that it can be a major factor in contributing to general health problems.

Enclosed you will find a copy of the May.1989 issue of DENTAL & HEALTH FACTS containing an editorial by Dr. David Eggleston. In particular. I refer you to page 5 where he briefly discusses that fact that OSHA classifies that excess amalgam which is not placed in the patient's mouth and taken out of the office must be treated as a hazardous material and appropriately disposed of. I have been informed by the Enviromental Engineer of Carson City that I must no longer dispose of Xray fixer down the sewer due to the potential silver contamination, but he is unconcerned about the ground-up mercury-amalgam fillings that go down the drain from every dental office and into the sewage-treatment plant and into the Carson River which has, as you know been placed on a priority list for Superfund clean-up by the Enviromental Protection Agency. I suggest they are "straining at a gnat and swallowing an elephant" on this matter.

Also enclosed you will find a copy of the September 1989 BIO-PROBE NEWSLETTER containing reports of VITAL NEW AMALGAM

PESEAPCH and a special article entitled, "WHO IS PESPONSIBLE FOP AMALGAM USE??.

As you read this you will get a picture of how the dental profession is being lead down the "prim-rose path" with no real legal defense in the use of such a controversial substance in healthcare today. Now the FDA has skirted responsibility by failing to require dental mercury amalgam to be properly investigated and classified. To place it in Class II "based on the Panel members' personal knowledge of, and clinical experience with, the device in the practice of dentistry" is the heighth of professional irresponsibility and deliberate misrepresentation. Dr.John Stanford is a PhD and has no clinical experience. Note that five of the nine members of the panel members are not even dentists. This would not be permitted for other questionable medical devices or medicines. I suggest that now is the time for appropriate governmental officers, such as yourself, to thouroughly scrutinize the indefensible posture taken by the Dental Device Panel of the FDA. The article in the Nevada Appeal dated February 27,1989 announcing your appointment as Chairman of the Subcommittee examining issues of toxic substances said you intended "to investigate the use and disposal of hazardous materials in factories, including aerospace plants". I request that you look at the use of such a hazardous material in healthcare and its potiential effects on the state of health of Americans. The article closes by quoting you saying"There is little we can do about the damage which is already taking its toll on our environment". I suggest that alot can be done to improve on the internal environment of the bodies of millions of the American people by: 1. Requiring Informed Consent before mercury containing fillings are placed (as advocated by the DAMS grass-roots movement mentioned on the back page of the May 1989 DENTAL & HEALTH FACTS). 2. See that the appropriate research is done so that "large scale epidemiological or clinical investigations"(see enclosed copy of Dr. Harold Loe s rsponse to me in 1986) are no longer delayed so that 3. Mercury-amalgam moratorium be declared as has been done in Sweeden, but with a much shorter termination time. See copy of November, 1989 BIO-PPOBE NEWSLETTER enclosed. The problem of an "inside the body clean-up" as required by EPA in the mentioned "enviromental clean-up of a hazardous waste" and who will be responsible to fund it will have to be decided later.

I assure you I will be most willing to help you in any way possible in your fulfilling my request. I have at my disposal a vast library of the current scientific literature as well as colleagues who are more knowledgeable than me who would be also most willing to share their knowledge and/or testify at appropriate hearings.

Wendel and I have discussed this matter at length and have thought that after you have had a chance to review this information we could meet and discuss it further and answer any questions you may have when you return to Nevada in January,1990. Please let me know how I can help.

I sincerely hope that your wife s health has become all that you and she have hoped and prayed for. Give her our best.

Sincerely Yours in Ouality of Life Dentistry,

Duane E. Christian, DMD

Senator REID. I failed to announce this, but everything today is being taken down and will be taken to Washington and spread among the committee. We will leave the record open for 10 days and if anyone wants to submit a statement, that can be done through my office here in Carson City or in Washington, and that will be submitted to this record to make it complete.

Doctor Christian, since almost all of us have had dental fillings at one time or another, could you comment on the use of amalgam fillings now? Are there satisfactory substitutes?

Dr. CHRISTIAN. As I indicated, I haven't placed a silver-mercury filling in 10 years, so, yes, there are satisfactory substitutes.

Senator REID. Are the others significantly more expensive though?

Dr. CHRISTIAN. There is additional expensive because they are more difficult to put in. They take more time.

Senator REID. But the compound itself is not any more expensive or, if so, not noticeably?

Dr. CHRISTIAN. Not significantly. The time is the main factor.

Senator REID. Are the substitutes widely used; gold, or whatever they might be?

Dr. CHRISTIAN. Yes. Gold, of course, has been traditional over the years when silver amalgam restorations were not placed. However, today we have what are called deposit resin fillings, which is a tooth-colored hard plastic material, and that is what I was addressing when I spoke.

Senator REID. And that works well?

Dr. CHRISTIAN. Yes.

Senator REID. Just more difficult to put in?

Dr. CHRISTIAN. Right. The American Dental Association has certified some of these materials now for use in most of your teeth. It was controversial for a long time and there is still a lot of controversy in dentistry, but the point is they have felt that there are some now which can, based on their criteria, be used.

Senator REID. Are they as durable?

Dr. CRISTIAN. Well, if there is anything to their certification, they must be. The literature indicates that the average life of an amalgam filling is 5 to 11 years. Now I am sure that there are people in the room who have had them in their mouths for 20 or 30 or more years, but any average implies two extremes. But compared to the average in the literature, I think they are comparable.

Senator REID. Mr. Rasner, it would be helpful if you would explain the health advisory process a little further. What is a health advisory?

Mr. RASNER. A health advisory tries to increase the public awareness as to problems and what effects it may have on people should they consume fish. Nothing more than just a warning of sorts to offer them an educated choice whether they fish there or want to consume fish or not.

Senator REID. And you issue health advisories on other subjects?

Mr. RASNER. Yes, we do.

Senator REID. Do you have an example of some other health advisory that has been issued?

Mr. RASNER. Well, the one that has been referred to here is the double advisory on Lahontan Reservoir itself, and this is posted.

Senator REID. Around the reservoir?

Mr. RASNER. Yes, it is. We work in conjunction with State Parks and Department of Wildlife. We post these early to mid-part of May just prior to the fishing season starting. We also issued press releases as follow up. We have also had a couple of advisories, as I stated earlier, on the shoveler ducks at Carson Lake because of the same problem we have here.

Senator REID. These health advisories aren't binding, are they?

Mr. RASNER. No, they are not.

Senator REID. And if you or any other person watched somebody catch six twenty-one inch fish and eat them, there is nothing to prohibit them from doing so?

Mr. RASNER. Yes, that's true.

Senator REID. You have indicated that the mercury health advisory is posted around Lahontan, could you tell us how they are posted and how often you check to find out that they are still there?

Mr. RASNER. What we do is prior to the season we have the advisories printed up and then we take them to the State Park's headquarters and they post them on the bulletin boards and some of the poster boards that they have around at the various lakes, Silver Springs beach, and so on. During the course of the summer, we go in and spot check to make sure that they are up.

Senator REID. Mr. Rasner, I'd like you to leave that and we'll make that Health Advisory part of the record.

[The health advisory follows:]

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STATE OF NEVADA
DEPARTMENT OF HUMAN RESOURCES
HEALTH DIVISION

Health Advisory

The State Division of Health has determined from a study completed by the State Division of Environmental Protection that a public health problem exists from eating fish from Lahontan Reservoir. Elevated mercury levels have been identified in gamefish from the reservoir.

THE DIVISION OF HEALTH ADVISES:

- No one should eat more than one meal per month of fish caught from these waters. A meal is considered to be eight ounces of fish.
- No child under age 12 should eat fish from Lahontan Reservoir.
- Children 12- to 15-years-old should eat no more than one four-ounce meal per month of fish caught from these waters.
- Pregnant women, nursing mothers and women who may soon become pregnant should not eat fish from Lahontan Reservoir.
- Walleye over 21 inches in length should not be eaten.

The study of this problem is continuing and as information changes, the Health Division will issue new statements.

Dated: May 1987

Senator REID. I was interested in the testimony that you gave indicating that a survey had been conducted and that sixty-odd percent of the people who were contacted said they could care less about the advisory, they would do whatever they wanted with the fish. Is that about it?

Mr. RASNER. That's exactly true. That information was gathered from the Department of Wildlife.

Senator REID. Is there anything that the Health Division can do to take stronger measures to control consumption of fish or waterfowl by sensitive populations? The point being that, as Doctor Christian indicated, somebody could have mercury poisoning and it would be most difficult to determine why they were sick.

Mr. RASNER. That would be something we would have to look into with the State health officer.

Senator REID. Would you try to find out and report to the committee whether there is in fact something more that can be done. What is the step above health advisory? My feeling is probably nothing, but if you would check it out, I would appreciate it.

Doctor Christian.

Dr. CHRISTIAN. In the communications I have had with the Health Division as well as with the Department of Wildlife, I have raised the question relative to would it be wise in their advisories to make mention of the fact that there are other mercury sources that people need to be aware of. Tuna, for example, and other forms of seafood that are commercially available can be high in mercury. He indicated that water along the Carson River has been checked to some degree. It would seem logical that there is contamination there. But certainly people with large numbers of amalgam restorations need to be aware that there are other sources that they need to consider rather than just the fish. I am not an attorney but it might be worthwile for these State departments to include in their advisories something to the effect of that the citizens be aware of total potential mercury exposure rather than confining it to fish.

Senator REID. Thank you very much, Doctor. We appreciate both you, Doctor Christian, and Mr. Rasner being here this morning. Give my best regards to Myla Florence, please. Thank you very much.

Our next panel consists of Lew Dodgion, Administrator, Nevada Division of Environmental Protection; William Molini, Director, Nevada Department of Wildlife; Russ Fields, Director, Nevada Department of Minerals; and Ira Rackley, Executive Director of the Carson Water Subconservancy District.

If you all would come up here. It is going to be a little bit crowded but I would like you all here because this is an important panel and we have a lot of questions from the committee.

Mr. Dodgion, would you please go first.

STATEMENT OF LEW DODGION, ADMINISTRATOR, NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

Mr. DODGION. Senator Reid, I am Lew Dodgion, Administrator of the Nevada Division of Environmental Protection.

As previous testimony has indicated, the State has been aware of the mercury in the Carson River and has had considerable concern about mercury in the Carson River since the early 1970s. And, again, as testimony has indicated, the source of the mercury in the river dates back to the Comstock Lode days, starting in about 1865 and continuing on to about 1895. There were a large number of mills that were located along the Carson River, particularly in the Brunswick Canyon area, and the tailings from the milling process were discharged directly into the river. Mercury was used to separate gold and silver from the ore and the process was obviously relatively inefficient since there were some 7,500 tons of mercury lost during that 30 year period. A large majority of that was discharged directly into the Carson River.

There was also a large number of mills located some distance away from the Carson River on tributaries to the Carson River and on the creeks and the drainages that lead into the River. Because of interest by private companies in mining and dredging the river, particularly in the Brunswick Canyon in the early 1980s, the Division of Environmental Protection in cooperation with the State Health Division and the Department of Wildlife conducted a study beginning in the late 1983 and continuing into 1984. That study was published in 1985 and we have provided copies of the study conclusions for the committee. A summary of our findings were that there was little or no mercury moving out of the Brunswick Canyon, but beginning downstream near the small community of Dayton the river sediment starting picking up and transporting relatively large quantities of mercury, carrying those on down into Lahontan Reservoir.

Senator REID. During the storms.

Mr. DODGION. During the storms and high flow. The mercury appears to be associated with the sediments and during high flow events they become mobile and move along the river down to Lahontan Reservoir. The Reservoir appears to be acting as a sink. We see very little movement of mercury from the Reservoir downstream of the dam. However, the dam was built in 1915, so mercury was carried throughout the river system prior to that and we still find movement of mercury downstream of the dam clear out to the Carson Lakes area and the wetlands area. We also find evidence of mercury in fishes and waterfowl in that area.

Senator REID. That area meaning the Stillwater area?

Mr. DODGION. The Stillwater area and Carson Lakes area. Our study found elevated levels of mercury in the fishes in Lahontan Reservoir and upstream as far as the Dayton area. These levels exceeded the FDA recommended levels for consumption in fish tissue of 1 part per million. We found some tissues that had been as high as 16 ppm.

We have found that there are still external sources of mercury to the river, that is in tailings and in sediments in the tributaries to the river system that probably contribute more mercury to the system again during storm events and spring runoff in their waters flowing down to the river system.

Because of concerns about the possibility of mercury contamination of groundwater that was being used in private wells as domentic water system sources, the Division conducted a limited sampling

program in 1986 to study this potential for groundwater contamination along the Carson River. We sampled two shallow wells that we established right adjacent to the river, one site right at a former mill site the other near Fort Churchill and we found no mercury in the groundwater. Shallow domestic wells that are located along the river and are in use for domestic water supplies were also sampled. Again, we found no mercury in these wells. The sites were all located within the flood plain of the Carson River.

Mercury has persisted in the Carson River system for over 100 years. Obviously, without some external mitigating force such as the study and clean-up perhaps that might be enabled by the Superfund program, mercury will continue to persist in the river system and continue to present problems with respect to the use of the river, the recreational uses of the river, and continue to present a problem to the public's health. The Division of Environmental Protection supports the proposed Superfund designation and we would recommend that the designation be extended clear from the Dayton area to the Stillwater Wildlife Refuge.

Senator REID. Mr. Dodgion, I will have some questions for you when we finish the rest of the panel. I would just, in passing, mention that I am sure it is hard for you to figure out which disaster to look to next. You have been very busy lately.

Mr. DODGION. Yes, sir.

Senator REID. Mr. Molini, you may proceed.

STATEMENT OF WILLIAM A. MOLINI, DIRECTOR, NEVADA DEPARTMENT WILDLIFE

Mr. MOLINI. Good morning, Senator Reid. I am William Molini, Director of Nevada Department of Wildlife. To try not to be repetitive, I think Lew pretty well covered the situation as it occurs with the Carson River, but let me review some of the points that you have already heard.

First, high levels of mercury have been measured in the water and sediments and in birds and animals, plants, fish, and waterfowl collected at or below the first mill site there at Carson City and extending, as has been pointed out, through Lahontan Reservoir to Carson sink. The high level of mercury that was recorded of shoveler ducks was from Carson Lake, which sits just south and west of the Fallon Naval Air Station. We haven't seen it at quite that same level at Stillwater although we do know there is mercury contamination there. All fish species collected in these reaches have shown elevated mercury levels, with larger fish containing levels of mercury above the FDA allowable level of 1 ppm.

In 1986 a Public Health Advisory was developed for fish caught in Lahontan Reservoir and, as you have heard, that was developed by the Nevada Department of Wildlife, Nevada Division of Environmental Protection and Nevada Division of Health. These regulations were strengthened in 1987 and after the results of sampling done in 1988, regulations now recommend that no fish over 21 inches be consumed. Mercury concentration in the 1988 fish samples ranged from 0.68 ppm or almost 0.7 ppm in an 8 inch white bass to 10.4 ppm—keep in mind, the FDA level for food consump-

tion is 1 ppm, and we are talking now 10.4 ppm—in a 40 inch stripped bass.

In 1989 a consumer health advisory was posted regarding the consumption of shoveler ducks after elevated levels of mercury were found in this species in the Carson Lake area, as you have already heard.

In response to an earlier question that you had, let me state that angler use at Lahontan Reservoir has declined precipitously from almost 158,000 angler use days in 1985 to 14,000 angler use days in 1988. Certainly there are a number of factors contributing to that decline besides the river contamination. Obviously, the drought is one major factor and its influence on the amount of water in that Reservoir. But a questionnaire sent to Nevada fishermen indicated that a significant number of fishermen no longer use Lahontan because of the mercury advisory regarding contamination of fish. The decrease in angler use has resulted in an economic loss, in our estimate, of more $3 million from decreased fishing use there.

With those things in mind, we too, as the Division of Environmental Protection, recommend that the Carson River have priority on the national Superfund priority list and that the Six-Mile Canyon are area receive priority clean-up for the Carson River Project in Nevada we have seen elevated levels of mercury as much as 500 ppm.

I do have a concern about the technology, as you mentioned in your opening comments, whether that technology may be there to safely remove the mercury, and certainly that is what we are all after. We would strongly support that provided the technology is there to clean that up without further damaging the environment by methylening or adding mercury to the system.

I do appreciate the opportunity to provide some comments on this Superfund proposal. Thank you.

Senator REID. Mr. Rackley, you're next.

STATEMENT OF IRA RACKLEY, EXECUTIVE DIRECTOR, CARSON WATER SUBCONSERVANCY DISTRICT

Mr. RACKLEY. Mr. Chairman, thank you. I am Ira Rackley and I am the Program Director of the Carson Water Subconservancy District. Our District is a tri-county water authority. It was established by the 1989 Nevada Legislature to manage and develop water resources on the upper Carson River Basin for agricultural, municipal, and industrial uses.

I don't want to repeat any of the quality comments that you have heard already, but I do want to state from the resource demand side that our district has very grave concerns about the impact of the mercury to the resource management program that we have developed for the Dayton area. This resource management program is predicated on using local resources within local areas as much as possible to meet the demands for our future. The Dayton area is totally dependent on the Dayton Valley groundwater aquifer. It is our concern that the mercury contamination, although it has not been found yet in any of the domestic wells, will contaminate the Dayton groundwater aquifer as the pressures on our groundwater system increase. Additional use of this aquifer may

change the hydraulic gradients to a degree where the mercury contamination could start showing up. We would hope that we would be able to gain a high priority on the Superfund list so that we can be proactive to prevent the contamination of this aquifer system rather than waiting until it enters the system and then we could potentially lose this aquifer.

As far as the future resource management of this area, our district has identified a dam site in the Brunswick Canyon area, which contains an area of the river that is highly contaminated with mercury, as Mr. Dodgion has previously stated. Part of the concern for not putting a reservoir in this area is the contaminated mine tailings. It is our concern that the inundation of these old tailings will contaminate a municipal reservoir thereby making such a project very expensive and perhaps unreliable.

Our district, Mr. Chairman, includes the area between Lahontan Reservoir and the California-Nevada line. And because of that, we are very much interested in the water quality of that entire stretch of the river. We have many municipal domestic wells that are dependent on the shallow ground well aquifer that is directly recharged out of the Six-Mile Canyon area. Again, our theory is that we want to avoid the possibility of the mercury contaminating the aquifer.

I represent the Rural Technical Advisory Committee to the Nevada Legislature's Commission to study water and waste water resources in the State, chaired by Assemblyman John Marvel. Mr. Marvel has asked me to state for the record that this legislative subcommittee also supports the placement of this stretch of the Carson River and the extension through the Lahontan Valley to Stillwater, as suggested by Mr. Dodgion, as high as possible on this list so that we can protect our resources.

Thank you.

Senator REID. Mr. Fields, it is my understanding you have some slides to show us also.

Mr. FIELDS. Yes, Senator, if it would be all right with you, I would like to show four slides which indicate the areas where the material that we're talking about came from.

Senator REID. Whenever you're ready.

Mr. FIELDS. Okay. I think I'll show the slides first and then begin my testimony.

This is the head of the Yellow Jacket Mine, which was one of the major mines on the Comstock. One of the primary reasons for this picture is to show that we're talking about an historical event here.

This, as all of you know, is Virginia City. This is looking across at the town. We are talking about an old mining camp that is well up in the mountains here.

This is looking down Six-Mile canyon into the Carson River drainage. Of course, Six-Mile Canyon does feed into the Carson River. You can see the tailings in the canyon there both from mining and other operations.

I can't seem to get this last slide to drop. So, I guess that's going to be it.

Senator REID. Why don't you tell us what was in the other one?

Mr. FIELDS. The other one was a slide of the lower district. It just showed an old mill foundation. Again, it was a picture of a very old operation.

Senator REID. Okay. Thank you. Why don't you proceed with your testimony?

STATEMENT OF RUSS FIELDS, DIRECTOR, NEVADA DEPARTMENT OF MINERALS

Mr. FIELDS. The purpose of this testimony is to provide you with an historical perspective on the metals that are in the Carson River. That is, how the metals got there. You alluded to it in your opening remarks and we have heard it from everyone else, so I'll try and go through this as quickly as I can.

As you know, prospectors came to the Virginia Range in the mid to late 1850s and by 1859 silver and gold production quickly grew to world class proportions at the Comstock.

1861 was a year in which many new mills were built to treat the rich Comstock ore. An 1863 California publication enumerated and described over 70 mills in the general area to handle that ore.

Senator REID. Seventy?

Mr. FIELDS. Over 70. The list included at least a dozen along the Carson River from Empire, which is just downstream from Carson City, to Dayton. By 1865, there were 18 Carson River mills at work. A map is attached to my written testimony which shows the locations and names of those mills.

Water was diverted from the river through the mills for power and also for use in the crushing and grinding process. In 1869, the Comstock Railroad—that is the Carson-Truckee Railroad—was put into place making the Carson River based mills even more economically attractive because as ore could be hauled down to the Carson River mills by rail, so could supplies be hauled back up to the mine.

The principle behind the stamp mill, which is the type of process we're talking about here, is very straightforward. A diagram is attached to my testimony of a stamp mill. Basically, the ore was crushed by a heavy metal stamp to a size which liberated the silver and gold. The stamps would be joined together in batteries. Once the ore was crushed and screened and the previous metals were freed from the rock, amalgamation was used to recover the silver and gold.

Amalgamation is the union between mercury and precious metals—in our case, of course, gold and silver here. This occurred when the mercury was brought into contact with the crushed ore spilling out from the stamp mill, along with the free silver and gold. Contact was made on a slopping copper plate that was coated with mercury over which the crushed ore and freed precious metals flowed in a thin film with water. This technique was introduced specifically for the Comstock in 1860. The precious metal rich amalgam was then "skinned" from the place and delivered to a process where the amalgam was mixed with screenings from the stamp mill. The finishing process was to send this amalgam to a retort where the mercury was boiled off and the precious metals

were separated. Water and tailings were sluiced away from the mill, either into or in the direction of the river.

From 1859 to 1880, the Comstock mines produced over $300 million worth of precious metals value. And it needs to be recognized that that was at $20 per ounce gold and $1 per ounce silver. Unfortunately, the milling process that I just described was not very efficient by today's standards. It has been estimated that the process only recovered between 65 and 75 percent of the precious metals. However, more relevant to today's hearing is the loss of mercury from this process. On average, the loss exceeded one pound per ton of ore milled, which would provide an estimate between ten and twenty million pounds of mercury into the river, or five to ten thousand tons—hence the average figure that you spoke of, the seventy-five tons. Most of this would have reached the river or at least be in its tributaries.

By the early 1880s, Comstock production was declining rapidly, and by the turn of the century it was all but done. In 1901, a new technology was introduced to the Comstock in an effort to treat the rich tailings that were left over from this earlier milling process. That was a processed that was developed at the University of Nevada and used cyanide, which is still in use today. This process was generally adopted after its introduction at mills throughout the west. The old amalgamation process, which lead to the problems we're speaking about today, was essentially dead as a result of this new technology which dawned at the beginning of this century.

In summary, the historical mills which treated the Comstock ores were the source of between 10 to 20 million pounds of mercury which was lost in the environment, much of it to the Carson system. Significant amounts must have ended up in either the Carson River or the Carson Sink. Along with the mercury are substantial values of gold and silver which escaped due to the relatively inefficient recovery of the amalgamation process. And finally the process was virtually eliminated by the turn of the centry as it was replaced by a new, cleaner process.

Thank you.

Senator REID. Gentlemen, I am wondering if we could impose upon your very busy schedules to take about a 5- or 10-minute break now. Do you have the time that you could do that? I have some extensive questions and this is the most appropriate time to do that.

The committee will be in recess for 10 minutes.

[Recess.]

Senator REID. The committee will come to order.

Willie, would you eat fish out of the Carson River?

Mr. MOLINI. Would I, Senator? Yes, I think I probably would. But I would be very cautious about eating a substantial amount of fish.

Senator REID. You wouldn't do it often, would you?

Mr. MOLINI. Not very often.

Senator REID. Fishing has declined but, of course, part of that, as you have indicated, is because during this period of time there has been a lack of water in the reservoir also.

Mr. MOLINI. Yes, that's true. Therefore, it has been difficult to pinpoint just what the effects of the mercury health advisory had

on fishing. What we get back is the normal reservoir levels that were in current years, I think we can debate about this, but I think as long as we keep the kind of data and continue with these health advisories, I would anticipate that some people are going to fish elsewhere.

Senator REID. It is true, isn't it, that people are more health conscious because of people in Mr. Dodgion's office being involved in programs in the State that didn't exist 5 or 10 years ago? The EPA is more concerned about chemicals on food and things of that nature. So I would think that certainly one of the reasons that there are less angler days at Lahontan is because of the health advisory that is posted all around there, when you can go someplace else and fish and not have a red and white sign staring you in the face saying eating the fish you catch may be detrimental to your health.

Mr. MOLINI. I would certainly agree with that.

Senator REID. Mr. Dodgion, in addition to seeking Superfund assistance to address the mercury contamination problem, is the State undertaking any activities to control mercury leaching from the tailing piles?

Mr. DODGION. Very limited, Senator. We have limited resources to do that. As we are able to shake some funds loose, we do try to further identify sources and external sources of mercury. That is something that we are trying to do. I think it is very important, because there still are external sources coming into the River, to cut those down first. In other words, if you just clean up the River and still have these external sources coming in, you have wasted your money.

Senator REID. Having been raised in a mining community and been around mines a lot, it gives me pause to think how difficult this problem is with these tailing ponds, as we refer to them, all over. It is a difficult problem given the limited assets of this State to do anything about it, isn't it?

Mr. DODGION. That's right. It is very difficult.

Senator REID. In fact, I don't know how the State could do anything, do you?

Mr. DODGION. I do not know, sir

Senator REID. Are there any other contaminants in the tailing piles? When I was a kid most of the tailings that had developed out around the Searchlight area were cyanide rather than mercury. That's what people were afraid of in the tailings at that area. Do we have a problem with cyanide leaching from the tailing ponds?

Mr. DODGION. We haven't identified any cyanide problems associated with Comstock or with the Carson River.

Senator REID. Generally speaking, cyanide is a much less pervasive substance than mercury, is that not true?

Mr. DODGION. That's the general belief. However, cyanide, once it gets down into the ground water, doesn't biodgrade and doesn't go away. We have documented some areas of ground water damage from cyanide from some historical operations.

Senator REID. Ira, I would be interested in your elaborating a little bit on your concern about there being more demand on the area for water and your concern about the aquifer being contaminated. Explain that in more detail to me.

Mr. RACKLEY. Certainly. The Dayton Valley, by the latest Lyon County master plan, is projected to grow to a population of about 30,000 people by 2010. The sole source of water for that growth will be the Dayton Valley groundwater aquifer. Our concern is that as we stress that aquifer, we will increase or change the hydraulic gradient between the River system and the existing public water systems. If that occurs, mercury may travel with that increased gradient and it could seriously damage the aquifer. The Dayton Valley is the most arid region of the tri-county area and if they lost that water source, it would be very difficult and very expensive to replace it.

Senator REID. I would direct this to Mr. Dodgion and Mr. Molini, have any measures beyond that health advisory been considered to control hunting of waterfowl or fishing in the areas we've indicated that contain high levels of mercury?

Mr. MOLINI. No, Senator, we have not. We truly have a serious question, I guess an ethical question, about just how we should handle the health advisories that we have had. Especially for ducks, because it was limited to shoveler ducks, which tend to be bottom feeders, so they feed on——

Senator REID. Tend to be bottom feeders?

Mr. MOLINI. Bottom feeders. They feed on invertebrates that are in the bottom sediments of the wetland, whereas many of the other dabbling ducks feed on vegetation that grows, it's submerged and it grows from the bottom, but they don't tend to feed on the invertebrates like Shovelers. So it appears that the situation would be absorbed most in that species of duck. But other than health advisories, no, we haven't had any substantial effort to curtail fishing or hunting activity in those areas.

Senator REID. Everyone has indicated that if there can be found a way to clean up the river, it should be cleaned up. A concern that I have heard expressed by each of you during your testimony is your concern that there may not be a way of cleaning up the river and we might be better off just leaving it alone. Is that what everyone has said?

Mr. DODGION. I think, Senator, that you have to be extremely careful in developing a clean-up mechanism because, again, the more the mercury is disturbed the more it becomes available to that pollution process. It is not going to be an easy task to develop. I think it can be done, but I think it has to be well thought out and it has to take into account the possibility of actually exacerbating the situation rather than improving it.

Senator REID. We're going to have testimony later today that will go into ways of cleaning up the river and I am sure you will each be interested in that.

Mr. Fields, are there any mining claims now operating in any of the areas we've spoken about today that could impact upon activity, dumping anything down those canyons into the river?

Mr. FIELDS. Well, the operations in the Comstock today are very limited in scope. I don't know the numbers but you can probably count them on the fingers of one hand. As far as their potential to contribute further to the contamination of the river, no, the regulatory controls that are in place today that are enforced by Lew's shop essentially require 100 percent contained system.

Senator REID. We talk about the tailing piles, tailings, it would seem that they should be fairly easy to clean up, isn't that right? The more difficulty would come with the river itself.

Mr. DODGION. The most difficulty would be with the mercury that is in the river, yes. The tailings outside the river is kind of minor. We have to sample them and determine where they are.

Senator REID. But most tailings are so easy to see. Then, of course, it would take some work to determine what's in the tailings. But as far as locating them, it is not like having to go on a search party to find them. I mean, you can see them, isn't that right?

Mr. DODGION. That's true. Your can find them, you can sample them, and then if you identify a claim owner, they can be cleaned up, stabilized, or some action would be available to——

Senator REID. So the real difficulty then would be in the river, we all acknowledge that?

Mr. Field, I was told that there has been an attempt to locate mining claims within the river. Do you know about that?

Mr. FIELDS. Yes, there have been attempts but they all fail very shortly after their inception because, as I understand it, that is land that is controlled by the State of Nevada through the State Lands Division and it is not land that is open to location under the mining laws of the Federal Government. This is a State controlled property. There have been proposals to mine the river; but as yet they have all been discarded by the regulatory agencies, who are expressing the same kinds of concerns that we're expressing today.

Senator REID. So far as any of you know, I couldn't go locate a claim on the river?

Mr. DODGION. I would say that is correct, you could not. There was a Division study started in 1983 on proposals by I think at least three different mining concerns that wanted to go in the Brunswick Canyon area and try to recover the gold and silver they think may be still being amalgamated with the mercury.

Senator REID. Would this be in the river then that you are talking about?

Mr. DODGION. Yes. Within the high water part of the boundaries of the river. Our study showed that very little, if any, mercury is still moving from the Brunswick Canyon area and probably that's due to the narrower channel, higher water——

Senator REID. But you could get it moving if you stirred it up?

Mr. DODGION. If you stirred it. So whatever is left in the Brunswick Canyon area is covered with fresh sediment that is coming from upstream. It is no longer available to the system. It is relatively safe, and it would be smart to leave it as is. An operation could could go in and stir that up and it could contribute a great deal more to the problem than to be part of the solution.

Senator REID. Mr. Dodgion, I should have asked this question of earlier witnesses, but do you know when the State of Nevada became aware that there were health problems with mercury being in the river?

Mr. DODGION. I believe it was in the early 1970s.

Senator REID. It has been fairly recently, hasn't it?

Mr. DODGION. Yes. There were studies started in 1971 and 1973, I think Doctor Christian gave a number of those letters, leading up

to the Division study in 1983-1984. I don't think there was anything predating say 1971.

Senator REID. Prior to that time it was used as a recreation area like any other river with no controls?

Mr. DODGION. Yes.

Senator REID. Willy, is the water level in the Stillwater area becoming dissipated, going from 50,000 acres down to 3,000, whatever it is now? Has that area become more contaminated? I know it has with other things but how about with mercury.

Mr. MOLINI. Yes, it certainly has exacerbated the situation. I can't say exactly what the scenario has been with mercury. As you know, it has a high specific gravity, it tends to accumulate a lot in sediments. Of course, Lahonton Reservoir has been a major mercury sediment trap I think precluding active movement downstream currently. But certainly there was movement prior to construction of Lahonton.

Senator REID. Prior to 15 years—10 or 12 years.

Mr. MOLINI. And what the diversion of water down there has done to concentrate mercury in that area, I couldn't say.

Senator REID. Mr. Dodgion, let's assume that this is not declared a Superfund site, by whatever the evaluation process is and we'll learn about that from the EPA, what, if anything, can be done by the State?

Mr. DODGION. I think very little will be able to be done by the State. The first thing that needs to be done with this is to do a very detailed biological study of the system to determine exactly where the mercury is within and without the river system and to deveop the feasibility of various technical ways of taking it out. That is going to be a relatively expensive process and I would estimate it would be somewhere between $250 to maybe $500 thousand.

Senator REID. Just the study?

Mr. DODGION. To do a good detailed engineering, scientific evaluation to develop alternatives for removing the mercury. What the State will be able to do, and, again, as I indicated before, as we have additional resources or spare resources here and there, we will continue to attempt to identify mercury tailing external to the system to see if we can't get that source shut off.

Senator REID. So determining where the mercury is in the river with the information you have is scientifically feasible?

Mr. DODGION. Yes.

Senator REID. The difficult question, after you once learn where it is—and even doing that would take time, effort, and money to detertmine where it is located in the river—but then the difficulty comes in determining how to remove it once you find out where it is?

Mr. DODGION. That's correct.

Senator REID. Gentlemen, thank you very much for your testimony.

Senator REID. Panel three consists of Alexis Strauss, Chief of the Enforcement Branch, Superfund Program, Region IX of the Environmental Protection Agency. Ms. Strauss, we welcome you to Nevada.

Ms. STRAUSS. Thank you.

Senator REID. Michael Smith, who is the Manager of the Hazardous Waste Division—and I always have trouble with the name of your company. I've seen it 100 times, but what is the proper way to say the name?

Mr. SMITH. It is CH2M Hill.

Senator REID. Just like it looks.

Mr. SMITH. Kind of like H_2O.

Mr. RASNER. CH2M Hill, Redding, California.

If the two of you would proceed with your testimony, I would appreciate it. First, Ms. Strauss.

STATEMENT OF ALEXIS STRAUSS, CHIEF OF THE ENFORCEMENT BRANCH, SUPERFUND PROGRAM, REGION IX, ENVIRONMENTAL PROTECTION AGENCY

Ms. STRAUSS. Good morning. I am Alexis Strauss, Chief of the EPA Superfund Enforcement Branch in our Region IX office. Since EPA proposed that a stretch of the Carson River be included on the National Priorities List on October 26, 1989, and since the Agency intends to make a final decision shortly, I wish to explain briefly our knowledge of site conditions and our plans for finding a solution.

The site consists of a 50 to 100 mile stretch of the Carson River and adjacent areas, contaminated by mercury from the historic operations of 12 to 18 mills. These mills discharged an estimated 14 to 15 million pounds of mercury to the Carson River during their active life at the close of the 19th century; now, the tailing piles they left behind discharge an estimated 8 million pounds annually to the river system. The site poses a threat to human health and the environment in various ways. Elevated levels of mercury have been documented in surface water, river sediments, and fish. The tailing piles may pose a threat to nearby residents who could inhale mercury vapors or mercury-contaminated dust. EPA has no current evidence of contamination in drinking water. Surface water is presently used for irrigation of food crops and forage. The site is used as a winter habitat for the bald eagle, an endangered species.

It is now EPA's responsibility to conduct a search of potentially responsible parties, or PRPs, to whom we would assign responsibility for investigation and clean-up. We have no information on the current status and viability of the original mills. Under the Superfund statute, current and past owners and generators are strictly liable.

Our next step is to undertake the legal research regarding ownership, which we plan to begin in October of this year. We will concurrently analyze options for immediate stabilization and containment of the tailing piles, pending a full site investigation. If our legal research identifies viable responsible parties, we will undertake negotiations for their conduct of the response actions needed. If viable parties no longer exist at this site, EPA would respond using available Superfund resources.

Inasmuch as we have several other sites in a similar status—which is awaiting initiation of the response action—due to resource constraints, we shall give this site our serious attention, consistent

with our mandate to address worst sites first. Forthcoming actions at this site would certainly include extensive coordination with the State of Nevada and other parties, who have developed all of the key technical documents on this site to date.

I would be pleased to respond to any questions you may have.

Senator REID. Would you please proceed, Mr. Smith, and then we will ask both of you questions.

STATEMENT OF MICHAEL SMITH, MANAGER, HAZARDOUS WASTE DIVISION, CH2M HILL, REDDING, CALIFORNIA

Mr. SMITH. Mr. Chairman, my name is Michael Smith and I am a Manager of the Hazardous Waste Division of CH2M Hill's offices serving the State of Nevada. CH2M Hill is one of the largest consulting firms in the country and has developed remedial alternatives for many hazardous waste sites. I am pleased to have this opportunity to discuss the issues relating to the recent proposed inclusion of a reach of the Carson River on the National Priorities List.

If the Carson River site is placed on the National Priorities List, further studies may be conducted at the site to better define the problem and to develop remedial alternatives. These studies may be funded by parties responsible for the contamination, or they may be funded by Superfund.

Once the site is placed on the National Priorities List and is funded, studies will be conducted according to the remedial investigation and feasibility study process under Superfund. At this point in the process, there is enough information to raise concerns regarding public health and the environment but the information is not sufficient to select remedial alternatives. Those potentially affected by the site naturally want to know very quickly the answer to the problem, how long it takes to clean it up, and what the costs will be. However, the nature and extent of contamination must be better defined before cost-effective remedial alternatives can be developed. It is critical that the scope of the investigations be focused on collecting only the essential engineering data needed to develop these alternatives. Many sites, especially mining sites because of the wide extent of contamination, require a phased approach to gather the essential data necessary to develop remedial alternatives.

The objective of the investigation is not to reach an unobtainable goal of removing all uncertainty, but rather to gather sufficient information to make an informed assessment of the major sources of the problem. This investigation must identify the location of the original source of contamination, where it has migrated to and how, what form the contaminants are in, and what the exposure routes are to the environment and human health.

Once sufficient data has been collected, remedial alternatives can be identified and evaluated according to the nine criteria for evaluating remedial alternatives under the Superfund remedial investigation and feasibility study process. EPA's decision in selecting a final remedy must balance the technical, institutional, environmental, and human health concerns with the costs of the final remedy. Consideration of whether the cost of work at this site would pre-

clude work at other sites that represent an equivalent or greater threat to human health or the environment must also be addressed.

You have heard previous testimony here today about meeting the widespread mercury contamination due to erosion of the site. Certain technologies have been identified in studies for other sites that may be appropriate for this site. For other mine sites that CH2M Hill is studying, and for mining sites discussed in the literature, erosion of stream site contaminants has been a serious problem. Studies on a mercury contamination site in California subject to erosion problems evaluated using revegetation, riprap, capping techniques, and removal of contaminated sediments. The range of estimated costs for these source control alternatives was $300,000 to $300 million.

Even though these and other technologies may be applicable for the Carson River site, there is insufficient information to develop and evaluate alternatives at ths time. If the Carson River site is included on the National Priorities List, it will be the beginning of a challenging project. For most of the mining sites that we have dealth with, no single technology or alternative has been identified to solve the problems. In addition, it is sometimes impossible to measure the effectiveness of certain technologies without pilot studies or actual implementation. In many cases, a phased approach has been employed in which one technology is implemented and then evaluated in terms of effectiveness in place, prior to the implementation of future alternatives. There will be no magical cures.

Thank you for this opportunity to speak at this hearing.

Senator REID. Thank you very much.

When Superfund was first passed, there were sites that people indicated would be impossible to clean up, one is the PCBs in the Hudson River. Now it is my understanding, Ms. Strauss, that they are being cleaned up, that it has been identified as a site and they are proceeding to clean the PCBs out of the Hudson River. Do you know about that?

Ms. STRAUSS. I am not as familiar as one of our other regional offices would be, but from what I recall, inasmuch as clean up is underway, they are having trouble wiht what one of the gentlemen mentioned earlier, which is entraining the very contaminants you had sought to control. It is very difficult to clean both the surface water body, like that part of the river, to come up with a solution that doesn't, over let's say a few decades, exacerbate the problem as we stir it up. What we think it may come down to here are looking at the options: can technically, engineering-wise, can the sediments be removed from the River and what are the environment and human health consequences of trying to do so. We may have to do it, for example, speaking down the line, if one were to try this on a pilot basis, you may incur enough of a release that you may not want to proceed further. And so as Mike has suggested, there may be options that we will consider, both the Federal Government and the State, but we may find ourselves discarding those options. There is no perfect other system model that we can turn to.

Senator REID. It would seem that in that this is a relatively small river compared to the Hudson, for example, most Nevada rivers

are small. I assume that one of the ways would be to start up-river someplace and take a segment of it to determine if, in fact, it could be done, or work with a small part of the river rather than the whole thing, as you indicated, maybe a test program. Is that right?

Ms. STRAUSS. I think that would be a prudent thing to do if we could allay the various concerns about not incurring any futher release downstream. If that is viable, we can design and fund such a study. That would be one way to proceed, rather than picking such a solution without having made that part of the study.

Senator REID. I know one of the responsibilities that your Agency has—and that's in keeping with the Superfund legislation—is to determine if, in fact, there are responsible parties that in effect caused this. From the testimony we've heard here today, even though that is a legal requirement and you will have to do that, it doesn't stretch the imagination far to indicate that Mr. Sutro, who dug the tunnel, and all such people are long since gone and their companies are no longer in existence. You understand that?

Ms. STRAUSS. I would need to confirm that, but that's my concern and my fear that we will be putting the entire burden on the Superfund program, financial and resource-wise. If it's indeed true then that's what we're faced with, if there is no semblance of a successor, corporation or claim, that's the situation we'll be in, quite correct.

Senator REID. A number of the Superfund sites that are now being cleaned are being done with a mix of Federal and private sources, isn't that right?

Ms. STRAUSS. That's correct. Increasingly private sources. Our enforcement record for the last few years has been a great improvement over our early years, and more and more companies see both the physical advantage and others of doing the work themselves with a much lesser level of EPA oversight rather than on a reimbursement basis, which is a little more expensive option.

Senator REID. And the EPA enforcement procedures are going to be even better. We have met in recent weeks with the people in Washington. The subcommittee of which I am the chairman has enforcement jurisdiction over the EPA and those responsibilities and they are going to get even better.

Tell me, Mr. Smith, your company, it is my understanding, has been involved around the country in clean-up efforts, isn't that right?

Mr. SMITH. That's correct.

Senator REID. And would you indicate—well, you've already told us that you've had no experience other than in California looking at a mercury contamination site, but you don't have any recommendations as to how clean this one up. What are some of the unique things your company has done as far as cleaning up contamination that has been left previously?

Mr. SMITH. CH2M Hill has conducted cleanup investigations on several mining sites around the country. The source of the problem at the Carson River site is the "tailings" that were generated at the Old Stamp Mills and have migrated to the Carson River. CH2M Hill has conducted pilot studies, designed, and implemented alternatives that have covered tailings with impermeable caps, removed tailings, and stabilized tailings through use of vegetation. One of

those mining sites in Montana has 127 miles of contaminated streams.

Senator REID. Are you attempting to clean that?

Mr. SMITH. Pardon me?

Senator REID. Is an attempt being made to clean that?

Mr. SMITH. Yes. We have developed several alternatives to solve the contamination problem. The contamination is so widespread, we have divided the site into several units to allow a more efficient cleanup approach.

Senator REID. It is contaminated with what?

Mr. SMITH. Mine tailings have been distributed in the stream channel and flood plain all along the creeks and river. The contamination is primarily heavy metals—copper, zinc, cadmium, and lead. Concentrations are so high in some of the creeks that no fish can survive.

It is the Clark Fork River that flows into Idaho from Montana. So I think that mining sites are more difficult sites. But I think the main thing is to focus on the problem where you do individual source and you attack that. Some of the previous studies that have been done have shown that some of the tailings along the river are the most mercury rich and those are the areas that we would focus on first.

Senator REID. One of the things that we haven't talked about here today in detail is the fact that it doesn't have to be an all or nothing proposition. One of the things that could be done is to clean the tailings, stop them from allowing further leeching into the river. As Mr. Dodgion indicated, we can certainly establish where those tailing piles are. So it would be possible—and I am asking this in the form of a question—that we could clean up the tailing piles and not touch the river, isn't that true?

Ms. STRAUSS. I think that we need to address the tailing piles perhaps at the very earliest. It is something that seems do-able. But I am skeptical. I have a suspicion that our options will come down to containing those pilings in such a way that they no longer leach out, but I rather suspect those piles are going to be there in perpetuity. We were discussing how there really aren't many destruction technologies for these kinds of materials. So we may be talking about a solidification or a cement-fixation kind of an option, although spread over a large area, that may not be feasible. Or we may be talking about controlling the drainage around the tailing piles and ensuring that they emit no hazardous vapors or other vapors that would effect people living and working nearby. But I doubt that those tailing piles will ever leave where they are at present. I may be wrong, and it would be very nice to be wrong in this case, but I have a suspicion that they will always be there and that our best hope will be to control them so that they neither release to the river nor release to the air.

Senator REID. It is interesting, one of the statements made by Ira Rackley is that the most arid area of the tri-county system over which he manages, is the Dayton area and that's where the big growth is taking place. There is an Arnold Palmer Golf Course going in and significant residential development right in that most arid area. So the problems aren't getting any better.

You have indicated that in October you, Mr. Smith, are going to start what is referred to as the—is it remedial investigation, is that the proper term, or what is it called?

Ms. STRAUSS. You have the proper term. I wish it were October. I believe that we will first have to go through the process of ensuring that there are no liable PRPs remaining.

Senator REID. You start that in October?

Ms. STRAUSS. We would start that in October and at the same time, what I would like to do is through our emergency response authority, find out if there is anything in the short term that we could do that the State agrees would be a useful thing to do with the tailings pilings themselves.

Senator REID. Excellent.

Ms. STRAUSS. Assuming that we find no remnants of viable PRPs, then the next step would indeed be the remedial investigation. The two options that we have there, assuming no PRPs, will be EPA will do the Federal response project or the State may do it with money through the EPA. In California we had experience with both and we will discuss it with DEP as to what is better in this situation.

Senator REID. Ms. Strauss, I know this would only be a ball park figure, but as far as the time within which to conduct the investigation after you have determined whether there are responsible parties, do you have a ball park figure as to how long that would take?

Ms. STRAUSS. If we can assume that we can quickly conclude that the mining claims and the like lead us nowhere, one can do this in a three- to six-month time period. My experience elsewhere is that sometimes it is not as clear as can be and that we have occasionally found mine site successor corporations, or potential successor liability. It is very hard to be clear about at this initial stage. If the responsible company just says, look, you are going to have to prove it down the line, in which case we simply take whatever money is available to us and get started on a separate track and we can always sort out the legal parts with those who won't be cooperative while we continue the technical investigation.

Senator REID. It is true, is it not, as indicated by Mr. Smith, that many of the Superfund sites—I could perhaps put it most of the Superfund sites—don't involve miles but acres of clean-up?

Ms. STRAUSS. That is typically an area-wide definition, you are right. Most of our sites in the western United States are defined by acreage. Some are very large, like particularly in Arizona, they are 40 square mile sites. Some of our basin-wide sites in Los Angeles are 100 square mile sites. And all of our sites with groundwater problems by and large, with a few exceptions, are very large. And this being a surface water body is best defined as you have in this 50-plus mile stretch.

Senator REID. From what I know, and certainly not nearly as much as you know, Ms. Strauss, each day that goes by the ability to clean up sites improves, is that not right based on experience that we have at other Superfund sites and technology that just becomes available. More companies are interested in becoming involved in these clean-up operations. Is that a fair statement?

Ms. STRAUSS. I think that is true on an annual basis and some of it was spurred by the reauthorization of the statute a few years ago with emphasis on alternative technologies. That spurred more research. I think we have a long way to go in terms of this particular kind of problem. Neither of us is particularly aware of much research into solving this kind of a problem. A lot of results are driven by the kinds of sites that are already on our list, and this is a quite atypical site, as you know.

Senator REID. And it is atypical because the Comstock was one of a kind and it came in a time period in the history of science when mercury was used so extensively, that's all that was used. And as the testimony here has indicated, there came a time when even during the later aspects of the Comstock they used a different process. I guess we are fortunate in some respects there weren't more Comstocks during that period of time because they would have been using the same mercury technology which would have been very contaminating to areas around it. I guess we are fortunate in Nevada even though we are not happy about this contamination in that the pollution is in a certain area. I mean, the Carson River was the only body of water around here so just about all of the mills and operations had to center around this little river. That would be fair to say, wouldn't it?

Ms. STRAUSS. I think it would be. I think it is something that you also have several people who spoke earlier or who have contributed technical documentation who are quite expert. It is quite different from some other situations where we may walk into where nobody really knows much about an area-wide dioxin problem. In this case, you can see it, you can see the tailing piles, and there are the kind of people here who know a great deal about it already.

Senator REID. I have no further questions. Thank you very much. I appreciate your both being here. As I said, welcome to Nevada, Ms. Strauss. We hope you come back often.

Senator REID. We inadvertently left off of our witness list Steve Weaver from the Nevada State Parks. Mr. Weaver, would you step forward, please. We apologize for doing that. I would have had you in the earlier panel but it was just an oversight.

STATEMENT OF STEVE WEAVER, CHIEF OF PLANNING AND DEVELOPMENT, NEVADA DIVISION OF STATE PARKS

Mr. WEAVER. My name is Steve Weaver. I am the Chief of Planning and Development in the Nevada Division of State Parks.

Lahontan State Recreation Area is comprised of some 30,362 acres, including the 12,000 acre Lahontan Reservoir. Under a long-term management agreement with the U.S. Bureau of Reclamation, the Nevada Division of State Parks is charged with managing recreation within the area.

Lahontan State Recreation Area visitors contribute significantly to the local economies. According to a 1987–1988 user survey conducted by the Division of State Parks, some $1.5 million is annually contributed directly to the Churchill County economy by Lahontan visitors. An additional $930,000 is contributed to the Lyon County economy. This, of course, does not include contributions to other counties. Sixty percent of the visitors, for example, are from

the Reno-Carson City area and we can assume that even more was spent in those areas. In 1989, even with reduced visitation, Reservoir users directly contributed almost $140,000 in user fees to the State's coffers.

Lahontan State Recreation Area has long received significant use by recreationists. For years it has been second only to Lake Tahoe Nevada State Park in this regard among the 22 State Park areas in Nevada. In 1984, visitation peaked at 566,000 visits, of which 31 percent were fishermen. This closely correlates with the 157,000 angler days recorded by the Nevada Department of Wildlife the following year (1985) when total visitation began to decline. By 1989, visitation was down to only 274,000, almost a 50 percent decline from the peak year of 1984. As was testified to earlier by Mr. Molini, fishing has seen an even greater reduction of almost 90 percent.

Much of this decline can be attributed to the extended drought that the State has encountered. However, mercury contamination fears by the general public regarding fishing, swimming, and other water contact sports have also contributed. In addition, informal observations and conversations with recreation users have been made by the State field staff regarding changing patterns of activities by Lahontan Reservoir fishermen who continue to fish the Reservoir. People have been catching and then releasing the fish more frequently. They are also tending to freeze fish taken from the Reservoir on a more frequent basis for gradual consumption over the winter months. Presumably, these phenomena can be directly attributed to mercury contamination concerns. Reversal of these trends can reasonably be expected with the clean-up of the mercury contamination within the Carson River system.

That concludes my comments.

Senator REID. One of the questions I have asked a number of the witnesses is the recreation potential of the Carson River area, including Lahontan. I would like your comments as to how the potential would be exacerbated, increased or improved, if, in fact, we didn't have this problem.

Mr. WEAVER. There is no way we can really differentiate between the effect that the mercury contamination has had versus the drought. We can only assume that the drought has contributed the most to this decline. I think if you look at fishing, the decline in fishing is almost 90 percent. I think that has as much to do with the mercury as it does with the drought because we have only seen a 50 percent reduction in the overall recreation.

Senator REID. Tell me about places other than Lahontan. Lahontan, of course, is set aside as a State Recreation Area. Are there areas up and down the Carson River that could be developed for recreational use?

Mr. WEAVER. I would say that the potential was pretty limited. There are opportunities for stream fishing, people are also involved in other activities such as bicycle riding and hiking and that sort of activity. But we're really talking about dispersed recreation, not concentrated recreation, so it is a relatively small number of people versus the concentrated recreation we see at Lahontan Reservoir.

Senator REID. These Health Advisory signs that are posted by the Health Division around Lahontan Reservoir, would you think

that would be a detriment to recreational opportunities at the Reservoir?

Mr. WEAVER. Yes, it very definitely has affected it, as Mr. Molini said. A lot of people just plain don't fish at Lahontan any more, they fish elsewhere so they don't have to worry about the problem. And I believe he testified that according to their 1988 survey, about 60 percent of the remaining fishermen—which represents a much lesser number than we had a couple years ago—aren't paying attention to the signs. The other 40 percent or so are the ones that are changing their habits as far as freezing fish and throwing the fish back instead of keeping them.

Senator REID. Thank you very much for your testimony.

As I indicated earlier today, anyone here today who wishes to present testimony in writing has that right to do so. We will keep the record open for another 10 days. Anyone wishing to present testimony can do so.

We appreciate everyone being here and the interest that has been expressed in this problem that has been in existence over 100 years. We look forward to finding a solution to this problem. Thank you very much.

The committee stands in recess.

[Whereupon, at 11:42 a.m., the subcommittee was adjourned, to reconvene at the call of the chair.]

[Statements submitted for the record follows:]

Division of State Lands
State Land Office
State Land Use Planning Agency
(702) 687-4363

Address Reply to
Division of State Lands
Capitol Complex
Carson City, Nevada 89710

STATE OF NEVADA

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Division of State Lands

February 14, 1990

The Honorable Harry Reid
United States Senate
702 Hart Office Building
Washington, D.C. 20510

Dear Senator Reid:

During the hearing on Monday, February 12, 1990, to investigate mercury pollution in the Carson River, in connection with designating the river eligible for Superfund money, you raised the question of ownership of the Carson River.

This letter serves to confirm that the State of Nevada owns the bed of the Carson River to the present ordinary high water mark of the river. A Nevada Attorney General's Opinion #204 dated April 20, 1976, concluded that "the State of Nevada owns the bed and shores of Lake Tahoe and other navigable bodies of water within Nevada to the present ordinary and permanent high water mark." Through formal court proceedings the Carson River has been determined to be a navigable body of water within the State of Nevada. The State of Nevada acquired title to the bed of the Carson River on the date of admission, October 31, 1864. All activities below the high water mark require authorization from this office.

We hope this information will assist you in your efforts to designate the Carson River eligible for clean-up under the Superfund program.

If you have any questions or require additional information, please contact this office.

Sincerely,

Pamela B. Wilcox
Administrator

PBW/EWB/kn

STATEMENT OF LEW DODGION, ADMINISTRATOR, NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

TESTIMONY ON CARSON RIVER MERCURY SUPERFUND DESIGNATION

SUBCOMMITTEE ON SUPERFUND, OCEAN AND WATER PROTECTION

THE CARSON RIVER MERCURY PROBLEM WAS INVESTIGATED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION IN 1983 AND 1984 AND REPORTED IN A 1985 PUBLICATION ENTITLED "TOTAL MERCURY IN SEDIMENT WATER, AND FISHES IN THE CARSON RIVER DRAINAGE, WEST-CENTRAL NEVADA".

THE DIVISION INITIATED THIS STUDY IN RESPONSE TO CONCERNS OVER IMPACTS OF MINING/DREDGING IN THE CARSON RIVER AND OVER PUBLIC HEALTH. THE OBJECTIVES OF THE STUDY WERE:

1. DEFINITION OF THE AREAL EXTENT AND RELATIVE MAGNITUDE OF MERCURY POLLUTION WITHIN THE DRAINAGE BASIN;

2. IDENTIFICATION OF MAJOR SOURCES, SINKS AND MOVEMENT OF MERCURY THROUGH THE SYSTEM;

3. DEVELOPMENT OF A DATA BASE FROM WHICH TO JUDGE FUTURE CONDITIONS;

4. DEVELOPMENT OF A DATA BASE TO ASSESS THE POTENTIAL HAZARD TO HUMAN HEALTH;

5. DETERMINE IF A RESTORATION PLAN IS NECESSARY AND/OR FEASIBLE.

SAMPLES WERE COLLECTED OF THE SURFACE WATER, SEDIMENT AND FISHES FROM THE CALIFORNIA STATE LINE TO THE TERMINAL LAHONTAN VALLEY WETLANDS.

THE SOURCE OF THE MERCURY HAS BEEN TRACED TO LARGE STAMP MILLS THAT WERE LOCATED ALONG THE RIVER CHANNEL THAT USED MERCURY TO SEPARATE SILVER AND GOLD FROM THE ORE DURING THE COMSTOCK LODE ERA (1865 - 1895). THE AVERAGE LOSS OF MERCURY WAS 0.65 Kg FOR EACH TON OF ORE MILLED. DURING THE 30 YEAR PEAK OF THE COMSTOCK IT IS ESTIMATED THAT 200,000 FLASKS OF MERCURY (APPROXIMATELY 7500 TONS) WERE LOST IN THE MILLING PROCESS. MORE RECENT INFORMATION SUGGESTS THAT MERCURY IS STILL ENTERING THE RIVER FROM AT LEAST ONE TRIBUTARY ORIGINATING IN THE VIRGINIA RANGE TO THE NORTHWEST. THE SOURCE OF THIS MERCURY IS CONTAMINATED TAILINGS PILES IN AND ADJACENT TO SIX MILE CREEK AND CANYON EXTENDING UP TO VIRGINIA CITY. ALTHOUGH THE CHANNEL OR WASH IS NEARLY ALWAYS DRY, MOVEMENT OF THIS CONTAMINATED MATERIAL INTO THE CARSON RIVER OCCURS DURING HEAVY PRECIPITATION.

THE 1985 STUDY FOUND THAT FROM DAYTON UPSTREAM, SEDIMENT, WATER AND FISHES HAVE TOTAL MERCURY LEVELS CONSIDERED TO BE NEAR

BACKGROUND. THE TRANSPORT OF MERCURY VIA LOADING IN THE RIVER IS ALSO LOW AT DAYTON. IN CONTRAST, MERCURY IN BOTH THE ABIOTIC AND BIOTIC COMPONENTS OF THE RIVER SHARPLY INCREASE BETWEEN DAYTON AND LAHONTAN RESERVOIR. WITHIN THIS REACH, SPRING RUNOFF IS THE PRIMARY FACTOR CONTROLLING THE DOWNSTREAM TRANSPORT OF THE SEDIMENT-BOUND MERCURY. LAHONTAN RESERVOIR, AN IMPORTANT SPORT FISHERY, RECEIVES A LARGE ANNUAL LOAD FROM THIS UPSTREAM SOURCE. THIS MERCURY LOAD HAS A DIRECT INFLUENCE ON MERCURY BIOACCUMULATION IN THE RESERVOIRS FISH POPULATION AND MANY FISH EXCEED THE 1 PPM FDA ACTION LEVEL FOR FISH CONSUMPTION. LAHONTAN RESERVOIR IS CURRENTLY SERVING AS A SEDIMENT MERCURY SINK, BUT THE DATA SUGGESTS THAT LARGE QUANTITIES OF MERCURY WERE TRANSPORTED PAST THE IMPOUNDMENT BEFORE DAMMING IN 1915. MERCURY CONTAMINATION IS HIGHLY VARIABLE BELOW LAHONTAN RESERVOIR IN TRUCKEE CARSON IRRIGATION DISTRICT REGULATORY RESERVOIRS AND LAHONTAN VALLEY WETLANDS.

RECOMMENDATIONS FROM THE STUDY WERE:

1. CARSON RIVER SEDIMENTS UPSTREAM FROM DAYTON SHOULD NOT BE DISTURBED AS THIS WOULD LIKELY CAUSE MERCURY RESUSPENSION, TRANSPORT, AND RECONTAMINATION OF RELATIVELY CLEAN SURFICIAL MATERIAL.

2. THE FEASIBILITY OF REMOVING MERCURY-LADEN SEDIMENTS FROM THE DAYTON TO LAHONTAN RESERVOIR RIVER REACH NEEDS TO BE FURTHER RESEARCHED. FACTORS TO BE CONSIDERED INCLUDE:

   a. THE DEGREE OF CLEANUP ATTAINABLE COMPARED TO THAT NECESSARY TO ACHIEVE RESERVOIR FISHERY GOALS
   b. IMPACTS ON OTHER WATER QUALITY VARIABLES
   c. IMPACTS TO FISH AND WILDLIFE HABITAT
   d. IMPACTS ON FUTURE CHANNEL STABILITY

3. MANY GAMEFISH IN THE LOWER CARSON RIVER AND LAHONTAN RESERVOIR EXCEED THE 1 PPM FDA ACTION LEVEL IN FISH TISSUE. THE HUMAN HEALTH RISK ASSOCIATED WITH CONSUMPTION OF THESE FISH SHOULD BE EVALUATED BY THE NEVADA DIVISION OF HEALTH AND A HEALTH ADVISORY CONSIDERED. (A FISH CONSUMPTION ADVISORY NOW EXISTS FOR LAHONTAN RESERVOIR AND THE LOWER CARSON RIVER)

4. THE STUDY DESCRIBED A SIGNIFICANT RELATIONSHIP BETWEEN SIZE AND MERCURY CONCENTRATION IN LAHONTAN RESERVOIR GAMEFISH; THE LARGER THE FISH THE HIGHER THE CONCENTRATION. THIS INFORMATION SUGGESTS THAT FUTURE MANAGEMENT OF THE FISHERY SHOULD CONSIDER THE SELECTION OF A MID-TROPHIC LEVEL SPECIES WITH A RELATIVELY SHORT

LIFE-SPAN THAT WOULD NOT ATTAIN A LARGE SIZE (I.E. WHITE BASS VS. WALLEYE).

5. FISH FROM LAHONTAN RESERVOIR SHOULD ANNUALLY BE MONITORED FOR MERCURY.

FURTHER RECOMMENDATIONS:

THE DIVISION OF ENVIRONMENTAL PROTECTION RECOMMENDS THAT PRIORITY SHOULD BE GIVEN TO MITIGATING TRANSPORT OF EXTERNAL SOURCES OF MERCURY TO THE CARSON RIVER. ONLY AFTER THESE EXTERNAL SOURCES ARE CONTROLLED SHOULD CONSIDERATION BE GIVEN TO THE FEASIBILITY OF REMOVING MERCURY CONTAMINATED SEDIMENTS FROM THE CARSON RIVER CHANNEL. WE ALSO RECOMMEND THAT THE SITE BE EXPANDED TO INCLUDE ALL CONTAMINATED AREAS BELOW LAHONTAN RESERVOIR AS THE SITE DESIGNATION CURRENTLY EXTENDS ONLY TO THE RESERVOIR DAM. OUR WORK AS WELL AS RECENT STUDIES CONDUCTED BY THE DEPARTMENT OF INTERIOR INDICATES SIGNIFICANT MERCURY BIOACCUMULATION IN ALL LEVELS OF THE FOOD CHAIN INCLUDING INVERTEBRATES, FISH AND WATERFOWL IN LAHONTAN VALLEY WETLANDS.

STATE OF NEVADA
DEPARTMENT OF WILDLIFE
1100 Valley Road
P.O. Box 10678
Reno, Nevada 89520-0022
(702) 688-1500

BOB MILLER
Acting Governor

WILLIAM A. MOLINI
Director

February 8, 1990

The Honorable Harry Reid, Chairman
Subcommittee on Toxic Substances, Environmental
Oversight, Research and Development
and
The Honorable Frank R. Lautenberg, Chairman
Subcommittee on Superfund, Ocean and Water Protection

Gentlemen:

I am William A. Molini, Director, Nevada Department of Wildlife. My office is located at 1100 Valley Road (P.O. Box 10678), Reno, Nevada 89520. I am here to provide comment relating to the recent inclusion of a 50 mile stretch of the Carson River on the Superfund National Priorities List and support for efforts to initiate cleanup.

Mercury contamination of the Carson River basin from old mining activity relating to the Comstock mining era of the late 1800's left a significant accumulation of this heavy metal in and along the Carson River from near Carson City to below Dayton. Varying historical reports estimate a total loss of between 10 million to 20 million pounds of mercury from 1860 to 1895.

Records indicate that much of this lost mercury was deposited in and along the Carson River and remains today in the Carson River system as a significant environmental hazard from Carson City to lower Lahontan Valley. River processes primarily related to spring flood flows have dispersed this mercury on a basin wide scale below the source points. Evidence indicates that mercury was carried as far as the Carson Sink before the construction of Lahontan Reservoir and its irrigation system, and mercury has been deposited extensively in Lahontan Reservoir since its construction.

High levels of mercury have been measured in water, sediments, invertebrate animals, plants, fish and waterfowl collected at and below the first mill site near Carson City and extending through Lahontan Reservoir to the Carson Sink. All fish species collected in these reaches have shown elevated mercury levels with larger

fish containing levels of mercury above the Federal Food and Drug Administration recommended level of .1 ppm in fish products destined for human consumption.

In 1986, a public health advisory was developed for fish caught in Lahontan Reservoir by the Nevada Department of Wildlife, Nevada Division of Environmental Protection and the Nevada Consumer Health Division. These regulations were strengthened in 1987 and after the results of 1988 sampling, regulations now recommend that no fish over 21 inches be consumed. Mercury concentrations from 1988 fish samples ranged from .68 ppm in a 7.9 inch white bass to 10.40 ppm in a 39.9 inch striped bass, a level well above USDA limits.

In 1989 a consumer health advisory was posted regarding the consumption of shoveller ducks after elevated levels of mercury were found in this species in the Carson Lake area.

Angler use has decreased on Lahontan Reservoir from 157,672 angler use days in 1985 to 13,960 angler use days in 1988. Although a number of factors influence angler use at Lahontan Reservoir including recent drought years, fish abundance and other factors, a questionnaire to licensed fishermen indicated that a significant number of fishermen no longer use Lahontan Reservoir because of the mercury advisory regarding contamination of fish. The decrease in angler use from 1985 to 1988 has resulted in an economic loss of more than three million dollars from decreased fishing use at Lahontan Reservoir.

The Nevada Department of Wildlife recommends that the Carson River have priority on the National Superfund Priority List and that the Six-Mile Canyon area receive priority clean-up for the Carson River Project in Nevada where elevated levels of up to 500 ppm have been found during recent monitoring.

Thank you for this opportunity to provide input into the National Superfund Priority List.

Sincerely,

William A. Molini

William A. Molini, Director
Nevada Department of Wildlife

Kennedy/Jenks/Chilton

Consulting Engineers and Scientists

1100 East Williams Street, Suite 207
Carson City, Nevada 89701
702 887 7450
FAX 702 887 7457

February 9, 1990

Senator Frank R. Lautenberg
Chairman
Subcommittee on Superfund,
Ocean, and Water Protection
U. S. Senate
Washington, D. C. 20510-6175

Subject: Inclusion on the Superfund National Priorities List of a 50-mile stretch of the Carson River

Dear Senator Lautenberg:

Please accept and enter this submittal as testimony from the Carson Water Subconservancy District on the inclusion on the Superfund National Priorities List of a 50-Mile stretch of the Carson River in Western Nevada. Our District has voted unanimously to support the State of Nevada's efforts in gaining a high priority for this action. Our objective in supporting this action is to preserve a valuable natural resource that is now contaminated to a high degree and may be unusable for recreation and municipal purposes. The District has developed a Resource Management Program for the Upper Carson River Basin which identifies this stretch of the river system as having a need for a municipal reservoir. The major problem in placing a reservoir in this reach of the river is the heavy contamination of Mercury that would be underlying the reservoir area.

The Carson Water Subconservancy District is a Tri-County water authority with a legislative charge of managing the quality and quantity of the ground and surface water resources of the upper Carson River Basin. This charge is granted to the District by Nevada Revised Statutes Chapter 541. The District Board consists of representatives of the governing bodies of Douglas County, Carson City, and Lyon County as well as the agricultural interests of the upper Carson River System in the State of Nevada. The jurisdictional area that this District represents includes the Carson River Basin above Lake Lahontan to the Nevada-California State Line. The area involves portions of Douglas County, Carson City, and Lyon County. This area is one of the fastest growing areas of the Western United States.

The heavy mercury contamination identified as the Carson River Mercury Site (CRMS) extends over such a large portion of our District area it potentially affects our Dayton Valley Groundwater Aquifer. This aquifer is the sole source of water for Dayton Town Utilities, the public water purveyor which supplies water to the rapidly growing Dayton area. The Dayton Valley Aquifer is a shallow aquifer which receives much of its recharge from the flows of the Carson River and Six Mile Canyon. It consists of permeable sands and gravel which are capable of facilitating movements of contaminants into the ground water system.

The Dayton Area also includes many individual wells which use the shallow upper portion of the Dayton Valley Groundwater Aquifer for their domestic supply. The Dayton Valley is projected to contain a population of 30,000 people by the year 2010. The vast majority of the water for this population will be supplied by either a reservoir within the CRMS area or infiltration galleries strategically located near the river system. Either alternative of water supply is adversely impacted by the CRMS.

In summary, the lower carson river system is a major source of water for this region. It's recharge of our groundwater basins and the fact that it is the sole source of water which our future economic base is dependant upon makes the contamination contained within the CRMS a major concern for our district. We request that you give the CRMS a high priority on the Superfund National Priorities List.

Thank you for the opportunity for testifying on this matter.

Sincerely,

Ira S. Rackley
Program Manager
Carson Water Subconservancy District

TESTIMONY OF
RUSS FIELDS
EXECUTIVE DIRECTOR
NEVADA DEPARTMENT OF MINERALS

BEFORE

U.S. SENATE SUBCOMMITTEE ON
SUPERFUND, OCEAN AND WATER PROTECTION

THANK YOU, MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE. I AM RUSS FIELDS, EXECUTIVE DIRECTOR OF THE NEVADA DEPARTMENT OF MINERALS. WE APPRECIATE YOU COMING TO NEVADA.

THE PURPOSE OF MY TESTIMONY IS TO PROVIDE YOU WITH A HISTORICAL PERSPECTIVE ON THE METALS IN THE CARSON RIVER. THAT IS, HOW THE METALS GOT INTO THE RIVER.

PROSPECTORS CAME TO THE VIRGINIA RANGE JUST NORTH AND EAST OF HERE FROM CALIFORNIA IN THE MID 1850's. THE WORLD FAMOUS COMSTOCK LODE BEGAN DEVELOPMENT IN 1859 AND SILVER AND GOLD PRODUCTION QUICKLY GREW TO WORLD CLASS PROPORTIONS.

1861 WAS A YEAR IN WHICH MANY MILLS WERE BUILT TO TREAT THE RICH COMSTOCK ORE. AN 1863 CALIFORNIA PUBLICATION ENUMERATED AND DESCRIBED SEVENTY-SIX STAMP MILLS IN THE GENERAL AREA TO HANDLE THE ORE. THE LIST

INCLUDED AT LEAST A DOZEN ALONG THE CARSON RIVER FROM EMPIRE (JUST DOWNSTREAM FROM CARSON CITY) TO DAYTON. BY 1865, 18 CARSON RIVER MILLS WERE AT WORK. A MAP IS ATTACHED TO MY WRITTEN TESTIMONY. WATER WAS DIVERTED FROM THE RIVER THROUGH THE MILLS FOR POWER AND FOR USE IN THE CRUSHING AND GRINDING PROCESS. IN 1869, THE RAILROAD WAS COMPLETED FROM CARSON CITY TO VIRGINIA CITY, MAKING THE CARSON RIVER BASED MILLS EVEN MORE ECONOMICALLY ATTRACTIVE AS ORE WAS CARRIED DOWN FROM THE MINES AND SUPPLIES WERE CARRIED BACK UP.

THE PRINCIPLE BEHIND THE STAMP MILL IS STRAIGHTFORWARD. A DIAGRAM OF A MILL IS ATTACHED TO MY WRITTEN TESTIMONY. THE ORE WAS CRUSHED BY HEAVY METAL STAMPS TO A SIZE WHICH LIBERATED THE SILVER AND GOLD. ONCE THE ORE WAS CRUSHED AND SCREENED AND THE PRECIOUS METALS WERE FREED FROM THE ROCK, AMALGAMATION WAS USED TO RECOVER THE SILVER AND GOLD.

AMALGAMATION IS THE UNION BETWEEN MERCURY AND GOLD OR SILVER. THIS OCCURRED WHEN MERCURY WAS BROUGHT INTO CONTACT WITH THE CRUSHED ORE SPILLING OUT FROM THE STAMP MILL, ALONG WITH THE FREE SILVER AND GOLD. THE CONTACT WAS MADE ON A SLOPING COPPER PLATE COATED WITH MERCURY OVER WHICH THE CRUSHED ORE AND WATER (OR PULP) WAS ALLOWED TO FLOW IN A THIN FILM. THIS TECHNIQUE WAS INTRODUCED IN 1860. THE PRECIOUS METAL RICH AMALGAM WAS THEN "SKINNED" FROM THE COPPER PLATE AND DELIVERED TO A PROCESS WHERE THE AMALGAM WAS MIXED WITH SCREENINGS FROM THE STAMPMILL. THE PRODUCT FROM THAT PROCESS WAS CLEANED AND SENT TO A RETORT FOR FINAL SEPARATION OF THE SILVER AND GOLD FROM THE MERCURY. THE MERCURY WAS CAPTURED AND REUSED IN THE SYSTEM. WATER AND TAILINGS WERE SLUICED AWAY FROM THE MILL, EITHER INTO OR IN THE DIRECTION OF THE RIVER.

FROM 1859 TO 1880, THE COMSTOCK MINES PRODUCED A LITTLE OVER $300

MILLION IN PRECIOUS METALS VALUE. THIS WAS AT $20 PER OUNCE GOLD AND $1 PER OUNCE SILVER. UNFORTUNATELY THE MILLING PROCESS I HAVE DESCRIBED WAS NOT TOO EFFICIENT. IT HAS BEEN ESTIMATED THAT THE PROCESS ONLY RECOVERED 65 TO 75% OF THE PRECIOUS METALS. HOWEVER, MOST RELEVANT TO TODAY'S HEARING IS THE LOSS OF MERCURY FROM THE MILLING PROCESS. ON AVERAGE, THE LOSS EXCEEDED ONE POUND OF MERCURY FOR EACH TON OF ORE MILLED OR BETWEEN 10 TO 20 MILLION POUNDS. THIS WOULD BE BETWEEN 5 AND 10 THOUSAND TONS, MOST OF WHICH WOULD HAVE REACHED THE CARSON RIVER OR ITS TRIBUTARIES.

BY THE EARLY 1880'S, COMSTOCK PRODUCTION WAS DECLINING RAPIDLY, AND BY THE TURN OF THE CENTURY IT WAS ALL BUT DONE. IN 1901, A NEW TECHNOLOGY WAS INTRODUCED TO THE COMSTOCK IN AN EFFORT TO TREAT THE RICH TAILINGS OF THE EARLIER MILLING ACTIVITIES. THIS WAS A CYANIDE PROCESS THAT WAS DEVELOPED AT THE UNIVERSITY OF NEVADA. THIS PROCESS WAS GENERALLY ADOPTED AS NEW MILLS WERE ERECTED THROUGHOUT THE STATE AND THE WEST. THE OLD AMALGAMATION PROCESS WAS ESSENTIALLY DEAD AS A RESULT OF THE NEW TECHNOLOGY WHICH DAWNED WITH THE BEGINNING OF THIS CENTURY.

IN SUMMARY, THE HISTORICAL MILLS WHICH TREATED THE COMSTOCK ORES WERE THE SOURCE OF BETWEEN 10 AND 20 MILLION POUNDS OF MERCURY LOST IN THE ENVIRONMENT. SIGNIFICANT AMOUNTS OF THAT MUST HAVE ENDED UP IN THE CARSON RIVER BETWEEN CARSON CITY AND THE CARSON SINK. ALONG WITH THE MERCURY ARE SUBSTANTIAL VALUES OF GOLD AND SILVER WHICH ESCAPED DUE TO THE RELATIVELY INEFFICIENT RECOVERY OF THE AMALGAMATION PROCESS. THE PROCESS WAS VIRTUALLY ENTIRELY REPLACED AFTER 1901 BY A NEW, CLEANER PROCESS.

THANK YOU

PLATE CLXIV.

ORE DRESSING MACHINERY.——COLORADO STAMPS.

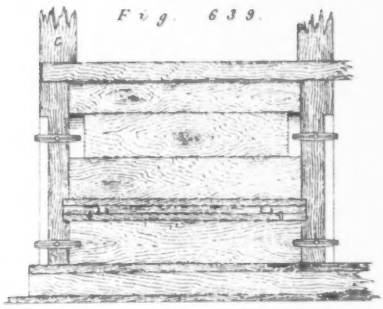


Fig. 639.

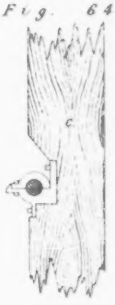
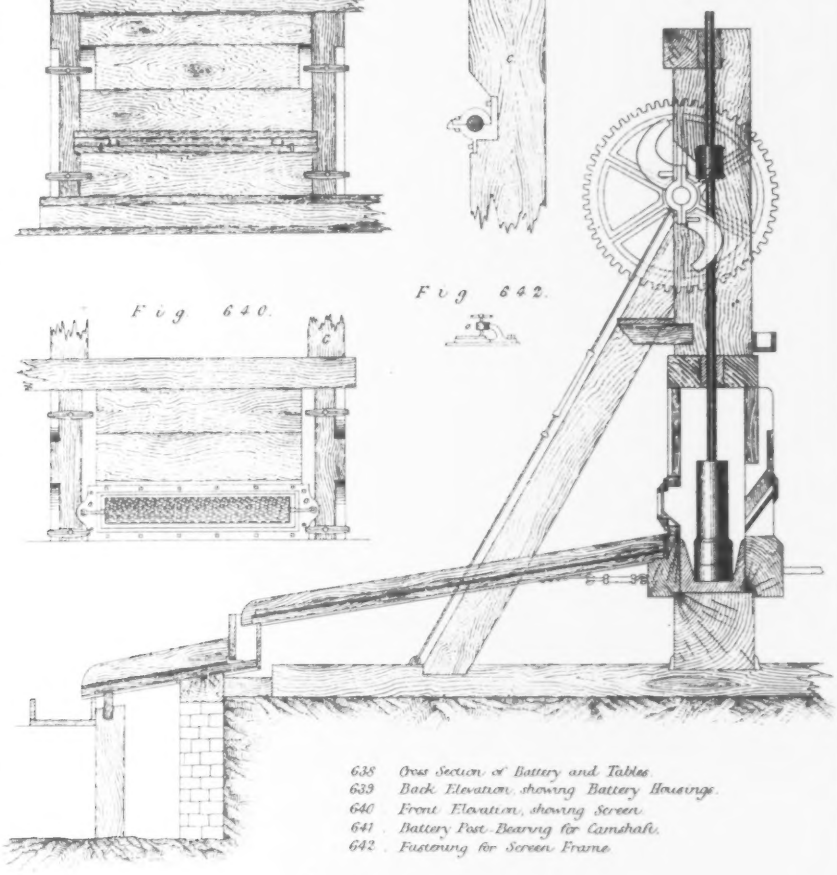


Fig. 641.

Fig. 638.

Fig. 640.

Fig. 642.



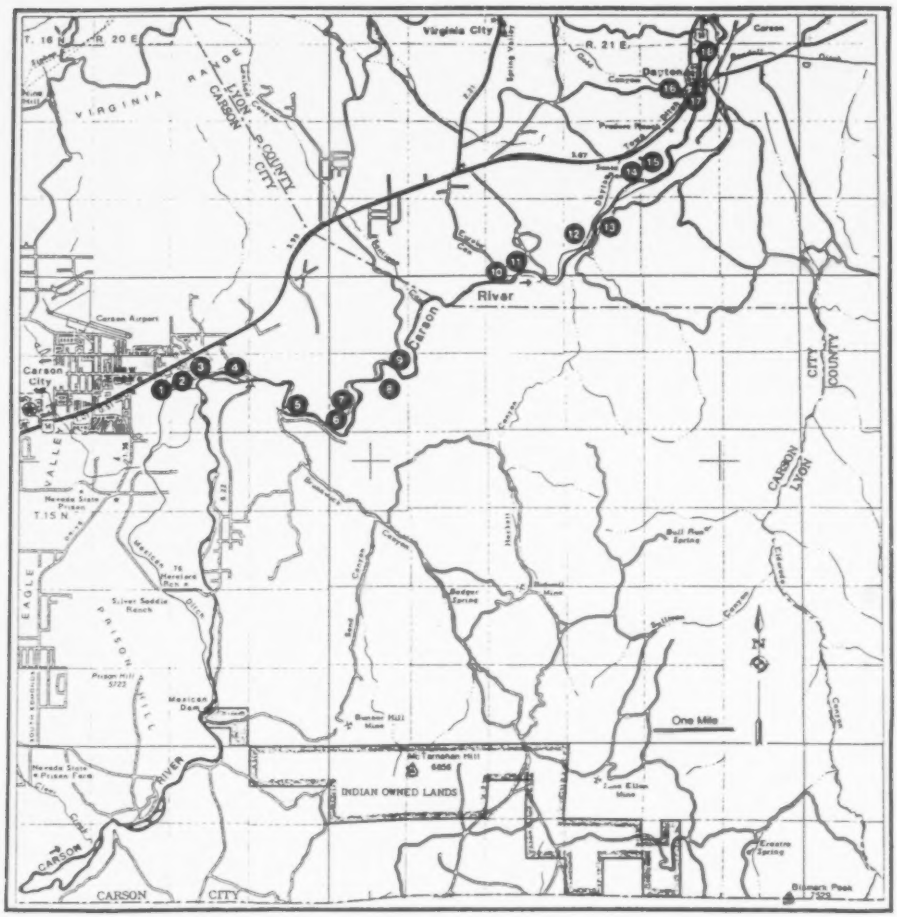
638 Cross Section of Battery and Tables.
639 Back Elevation, showing Battery Housings.
640 Front Elevation, showing Screen.
641 Battery Post Bearing for Camshaft.
642 Fastening for Screen Frame.

SCALE

G.G. ANDRÉ

E. & F. N. Spon, London & New York.

MAP 1



MAJOR HISTORIC MILL SITES ALONG THE CARSON RIVER
(1865)

STATE OF NEVADA

MILL SITE LOCATIONS
(Shown Above)

1. Mexican
2. Mead
3. Baldwin
4. Morgan
5. Brunswick
6. Merrimac
7. Copper Canyon
8. Vivian
9. Santiago
10. Eureka
11. San Franciso
12. Franklin
13. Island
14. Old Ophir
15. New Ophir
16. Golden Eagle
17. Illinois
18. Imperial

My name is Juanita Cox, I live in Storey County, Nevada at the Patrick Exit, Milepost 28 on Interstate Eighty.

Patrick is in a rural area on the Truckee River a few miles downstream from Reno/Sparks, and a few miles upstream from the Pyramid Lake Paiute Tribe's fisheries for Lahontan Cut-throat Trout and the endangered Cui-ui, a surviving prehistoric fish found only in the Truckee River system.

My neighbors and I are concerned about the environmental quality of the Truckee River and have watched environmental protection efforts across the nation in hopes we could afford those same protections to our river. We were encouraged to see legislation like the California Toxic Pit Clean-up Act which would address longstanding environmental hazards, clean them up, and encourage better waste management in the future.

Imagine our shock and dismay when we learned the clean up of California's Toxic Pits consisted of trucking their residue to the banks of the Truckee River at Patrick. Thirty Five Thousand Tons of hydro-carbon contaminated soil were dumped without notifying any Nevada government agency. Dumped in violation of special use permits. Dumped, and scheduled for

recycling by a company unqualified and unlicensed to re-cycle anything.

Our respect for California's environmental clean up has been seriously eroded. It is obvious to us that the real concern of the California Toxic Pit Clean-up Act is not **the environment**, but rather the environment of specific California real estate.

Now we are watching as you ladies and gentlemen begin to administer the Super Fund Clean up Act. We hope you will take a lesson from our experience. Moving hazardous material from urban and suburban environments to rural environments does not clean up anything. Moving toxins across state boundries will do nothing to nuetralize them.

We need to move the technology of environmental clean up beyond the concept of getting it out of sight by burying it in someone else's back yard.

35,000 TONS OF FORMERLY DECLARED HAZARDOUS/TOXIC WASTE DIRT CAME INTO NEVADA UNTIL STOPPED (JUNE 28, 1990) BY THE NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION (NDEP). (APENDIX A) IT WAS STORED ON THE BANKS OF THE TRUCKEE RIVER, 8 MILES EAST OF SPARKS AT THE GRANITE CONSTRUCTION COMPANY'S (GCC) PATRICK SITE. THE HYDROCARBON CONTAMINATED SOILS WERE PLACED "10 FEET FROM THE TRUCKEE RIVER" ACCORDING TO A JUNE 10, 1988 ARTICLE IN THE TRI-COUNTY EXPRESS. (APPENDIX B)

JUNE 24, 1988, JOSEPH S. LIVAK OF THE NDEP WATER QUALITY SECTION, ISSUED A FINDING OF ALLEGED VIOLATION AND ADMINISTRATIVE ORDER TO THE PARTIES FOR THE IMPORTATION OF SOLID WASTE INTO NEVADA UNDER MISLEADING OR ERRONEOUS PRETENCES AND DEMANDED "COMPLETE REMOVAL FROM THE PATRICK SITE NO LATER THAN OCT. 31, 1988". (APPENDIX C)

SEPT. 6, 1988, ALLEN BIAGGI, NDEP WASTE MANAGEMENT SECTION, ISSUED A FINDING OF ALLEGED VIOLATION AND ORDER DEVELOPED IN RESPONSE TO THE ILLEGAL TRANSPORT, STORAGE AND DISPOSAL OF HAZARDOUS WASTE IN THE STATE OF NEVADA, THE IMPROPER IMPORTATION OF HAZARDOUS WASTE INTO THE STATE OF NEVADA AND FALSE STATEMENTS AND REPRESENTATIONS MADE AS TO THE HAZARDOUS NATURE OF THOSE WASTES." WITH THIS ORDER, L.H. DODGION, ADMINISTRATOR OF NDEP, FURTHER ORDERED "IMMEDIATELY MAKE ARRANGEMENTS FOR THE REMOVAL OF THE CONTAMINATED SOILS IN QUESTION OUT OF THE STATE OF NEVADA. SAID WASTES SHALL BE REMOVED FROM THE STATE BY OCT. 28 1988". (APPENDIX D)

OUR FEARS FOR THE CONTAMINATED SOILS STILL IN THE FLOOD PLAIN WERE REALIZED OCTOBER 1988, WHEN TREMENDOUS RAINS AND FLASH FLOODING POSSIBLY CONTAMINATED THE TRUCKEE RIVER AND UNDERGROUND AQUIFERS.

JAN. 3, 1989 CONSENT AGREEMENT "THE DEP, THE WASHOE COUNTY DISTRICT HEALTH DEPARTMENT (WCDHD) AND THE PARTIES HAVE AGREED TO AN APPROPRIATE COMPLIANCE SCHEDULE FOR THE STORAGE AND DISPOSITION OF CONTAMINATED SOILS AND THAT DETERMINATION OF THE CIVIL ACTIONS SHOULD BE SETTLED ADMINISTRATIVELY TO AVOID PROLONGED LITIGATION AND TO OBTAIN AN EXPEDITIOUS AND DESIRABLE ENVIRONMENTAL REMEDY". IN THIS ALL PARTIES AGREED TO MOVE THE SOILS,

2,000 FEET WEST, ABOVE THE 100 YEAR FLOOD PLAIN BY FEB. 10, 1989. SOILS MAY BE STORED AT THE PATRICK SITE FOR "ONE YEAR" AND SELECT A NEW STORAGE SITE "OUTSIDE OF THE TRUCKEE RIVER CANYON WHICH IS ACCEPTABLE TO THE DEP AND THE WCDHD". "ALL SOILS SHALL BE REMOVED FROM THE STORAGE SITE TO AN APPROVED LOCATION ON OR BEFORE FEBRUARY 10, 1990. ON OR BEFORE FEBRUARY 10, 1990, A PLAN AND SCHEDULE FOR THE COMPLETE RECYCLE OR PROPER TREATMENT OR DISPOSAL OF THE RESIDUAL SOILS". (APPENDIX E)

NOV. 17, 1989, NDEP ALLEN BIAGGI, GAVE GCC UNTIL DEC. 31, 1990 TO REMOVE THE MATERIAL FROM THE PATRICK SITE. (APPENDIX F)

THE FOLLOWING ARE PROBLEMS: (APPENDIX G)

1. THE STATE GIVES TO MANY DEDLINES WHICH ARE NEVER MET.
2. GCC IS NOT A LICENSED RECYCLE FACILITY. IN FACT IT IS NOT IN THE PROPER ZONING AND IS IN VIOLATION OF ITS S.U.P. IN WASHOE CO.
3. CALIFORNIA'S HAZARDOUS WASTE REGULATIONS HAD BEEN WAIVED PURSUANT TO CALIFORNIA HEALTH AND SAFETY CODE, BECAUSE THE MATERIAL WAS TO BE "TRANSPORTED AND USED OR REUSED AS A SAFE AND EFFECTIVE COMMERCIAL SUBSTITUTE FOR A COMMERCIAL PRODUCT." (APPENDIX C)
4. QUESTIONABLE MATERIAL CAN BE BROUGHT INTO OUR STATE WITHOUT ANYONE KNOWING.

TO DATE, THE 35,000 TONS OF MATERIAL HAS BEEN DELUTED TO APPROXIMATELY 120,000 TONS. IT STILL SITS AT THE PATRICK SITE AWAITING USAGE BY DEC. 31, 1990. (APPENDIX G)

THE INDUSTRY STILL BELIEVES THE SOLUTION TO POLLUTION IS DELUTION.

THANK YOU.

JUANITA COX

NOTE: Attachments to this statement have been retained in committee files.

ERIC W. SWANSON

THE CARSON RIVER PROJECT

BEFORE THE

SENATE SUBCOMMITTEE ON SUPERFUND, OCEAN, & WATER PROTECTION

OF THE

COMMITTEE ON ENVIRONMENT & PUBLIC WORKS

UNITED STATES SENATE

CARSON CITY, NEVADA

FEBRUARY 20, 1990

Senator Reid, State and Federal Officials, concerned citizens of Nevada. My name is Eric Swanson. I represent the Carson River Project. I come before you today to offer a responsible alternative to placing the Carson River on the E.P.A. Superfund list.

Although I congratulated you for recognizing the desperate need to clean-up one of Western Nevada's primary river systems, I do strongly question the wisdom of the unneccesary expenditure of the taxpayers money. Private enterprise is ready, willing and able to join in partnership with the State of Nevada in an attempt to mutually prosper by converting an existing environmental liability into a potential state resource.

Senator Reid, you and I along with everyone else in this room are aware of the heavy demands on the taxpayers money, as a whole on the Federal and State levels, and on the E.P.A. Superfund specifically.

To my understanding if the Carson River were to be added to the Superfund list, it would be about 450-500 in priority. To date only 42 sites have been cleaned up since its creation in 1980. At that rate what are the realistic chances of the Carson River clean-up in the next 50-100 years? I doubt if there is another toxic waste clean-up site on the list where private enterprise has <u>voluntarily</u> asked to try to clean it up.

Please allow me the time now to give you the background on the Carson River Project's efforts. Between 1979 and 1983 much time, expense and extensive research was put forth to develop the proposal before you. This proposal and preliminary study plan was presented to State of Nevada Officials in September 1983 (7 years ago). The Carson River Project at that time had agreed to post a $1 Million line of credit to fund a Desert Research Institute study to determine the feasability of removing the toxic mercury from the Carson River. We felt, and still do feel this study is mandatory for many reasons. 1) Can the mercury and associated minerals be removed economically? 2) Can it be

Thank you for the opportunity to present this responsible alternative.

Eric W. Swanson
Carson River Project